POPULAR AVIATION

Including SOUTHERN AVIATION and AERONAUTICS

A MAGAZINE FOR THE PROMOTION OF PRIVATE FLYING AND COMMERCIAL AVIATION

Volume XXI | OCTOBER, 1937 | Number 4

TABLE OF CONTENTS

FEATURE ARTICLES

An Airy Chat With the Editor 14
Lockheed; from Vega to Super-Electra 16
Popping Them From the Air 19
Jimmie Mattern, Polar Explorer 21
A Fairey "Battle" (full-page picture) 23
Rome's Modern Legions Hurl World Challenge 24
" . . . Clear and Unlimited" 27
Britain's Death Angel 29
Wings Across the Seas 30
"Caledonia" by Short Bros. (full-page picture) 31
Freighter or Fighter? 33
The New Knight Twister 35
"I Stepped Out Into Space—and Liked It" 36
The Baynes Bee 39
A New Yankee Terror 41
Taxi Drivers of the Sky 42
For Other Lands 45
A Day At a Civilian School 47
Where Is Rocketry Today? 49
Building the Fairchild Ranger 50
Airplane Wing Loading Chart 53
Making Transport Loading Simple 54

PICK OF THE BRIEFS

Boo, Dear Reader, Boo! 20
Our Front Cover: The Luscombe Phantom 22
At Last—a Low Priced Sextant 28
The National Air Board Says 34
A New Aerial Camera 34
Curtiss XSBC-3 (three-view drawing) 38
The New Boeing Trainer Nears Completion 40
A New Technical School 40
A Woman Airline Director 46
They Were Awarded Diplomas of Merit 46
Blackburn Sharks Built in Canada 46

Copyright, 1937
ZIFF-DAVIS PUBLISHING COMPANY
Member of the Audit Bureau of Circulations.

POPULAR AVIATION, Volume 21, Number 4, October, 1937. Published monthly by Ziff-Davis Publishing Company at 608 South Dearborn Street, Chicago, U. S. A. William B. Ziff, Publisher; B. G. Davis, Editor; John B. Rathbun, Managing Editor; Swanee Taylor, Associate Editor. New York Office, 381 Fourth Ave., New York City. Subscription $2.50 per year, single copies, 25 cents; foreign postage, $1.00 per year extra except Canada. Contributors are especially advised to retain copy of their contributions, which must be accompanied by return postage. All such material will be handled with reasonable care, but this magazine assumes no responsibility for its safety. Any copy accepted is subject to revision or changes to meet the requirements of this publication. Payment for copy used will be made at our current rates upon publication and photos and drawings will be considered as constituting a part of the manuscript in making payment unless otherwise specified. Entered as second class matter, January 24, 1933, at the Post Office, Chicago, Ill., under the act of March 3, 1879.

First of the Lockheeds not to be named for the stars, the "12" is for the wealthy sportsman pilot.

TWENTY-ONE years ago two brothers, Allan and Malcolm Loughead, adopted what is known as monocoque construction. Today, Lockheeds are carrying American aircraft banners to the corners of the earth

LOCKHEED: From Vega

THE arm of a tall crane swung into the air. Suspended on the end of its cable was a long streamlined glistening metal shape—the fuselage of the first Lockheed "12" being overturned so that static tests could be made upon it.

Many years ago two brothers, Allan and Malcolm Loughead, probably dreamed of such a design as they worked in their Santa Barbara, Cal., factory building seaplanes for the U. S. Navy. The Loughead brothers were truly the pioneers of the streamlined airplane. It was in their California factory that the method of monocoque fuselage construction which characterized many Lockheed planes to come, was developed. In the early part of 1926 the brothers established a small factory in Hollywood and the Lockheed Aircraft Company became incorporated On July 4 of the same year the first *Vega* was flown. Two others followed it during the year. The factory in Hollywood became crowded and was soon given up for larger quarters in Burbank, the present site. Then the Detroit Aircraft Corporation took over the company and controlled it for two years, but Lockheed took it over again and since has produced some of the finest aircraft in the world.

When the first *Vega* appeared back in 1926 it astounded commercial aviation because of its unusual performance and load-carrying ability. This ship was the first of many to be produced in later years and was called the *Vega "1"*. It was a five-place cabin monoplane powered with a 220 h.p. Wright J-5 engine. The *Vega "1"* was the forerunner of others that were constructed until 1931. Meanwhile, when the last of the series, the *Vega 5C* was built. Meanwhile, the *Vega "Special"*, powered with a 225 h.p. Packard Diesel engine appeared. Series 3 was known as the *Air Express* and resembled the *Vega* except that the wing was raised from the semi-monocoque fuselage and the pilot sat aft of the four-place passenger cabin instead of forward as in the *Vega*. The *Air Express* was Wasp-powered as were all the ships of the "5" series. Two models of the *Vega "2"* series were Wright-powered and a third was equipped with a 300 h.p. Pratt & Whitney Wasp. The most popular of all the *Vegas* was the Type 5.

This *Electra* is doing service as the U. S. Army Air Corps' stratosphere laboratory.

Another famous Lockheed is the *Orion* owned by the Detroit News (above). Note the pilot-controlled news camera built into the wing

To Super-Electra

by MORTON B. KELMAN

This plane was a five-to-seven place ship with a wing span of 41 ft. and a length of 27 ft. 6 in. Top speed was 190 m.p.h., and it cruised at 180 m.p.h. It could be equipped with floats, thus accommodating five passengers instead of seven.

Wiley Post flew one to fame when he twice circled the globe. Amelia Earhart crossed the Atlantic and Pacific in a *Vega* and Jimmy Mattern and Bennett Griffin flew non-stop from Newfoundland to Germany in 1932. All flew the last type *Vega* to be built. The U. S. Army Air Corps utilized several of these ships as transport and cargo planes.

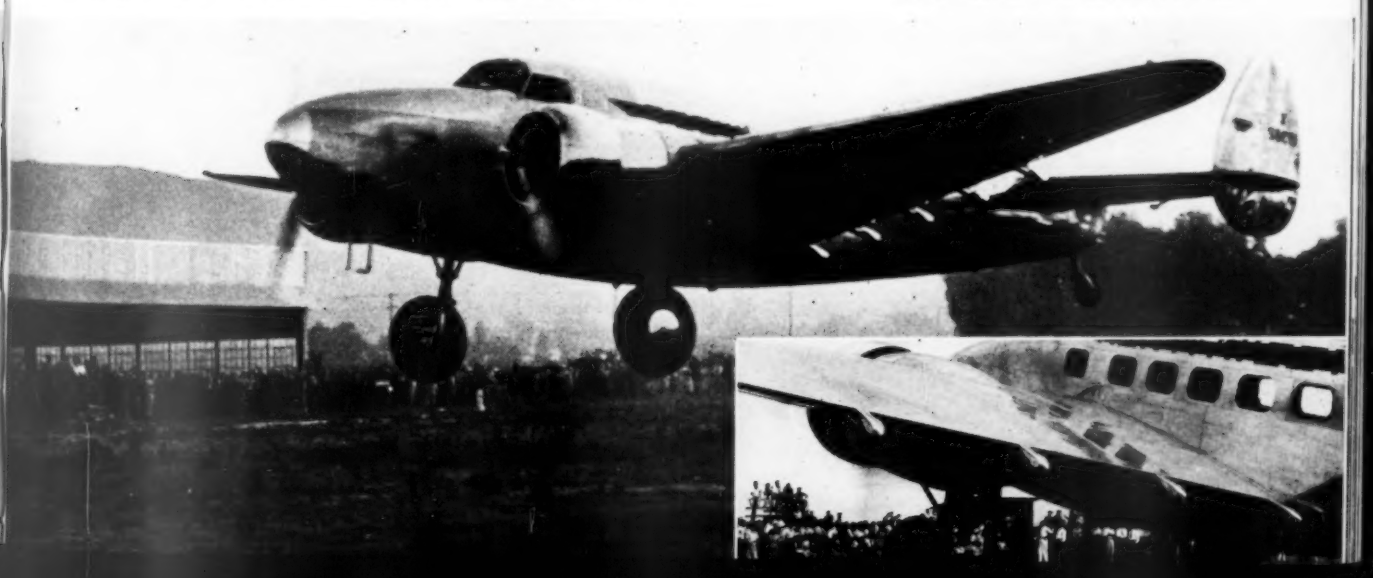
Following the *Vegas* came various types of the *Sirius*. These ships were low-wing monoplanes powered with either Wright or Pratt & Whitney engines. Many famous flights also were made in this type of plane, including Captain George Endres' and Alexander Magyars' flight from Harbor Grace to Bicske, Hungary, and Col. and Mrs. Charles A. Lindberg's flights in a float-equipped *Sirius*.

A modified version of the *Sirius* was the *Altair 8-D*, continuing in the Series 8 of the *Sirius* type. This plane resembled the *Sirius* to a great extent but had a retractable landing gear which its forerunner did not have. The Army Air Corps and the Navy purchased a few to be used for transports. These are known as the C-23 in the Air Corps and the RO-1 in the Navy.

During the period when the *Altair* and *Sirius* models were being turned out of the factory, Lockheed was experimenting with a two-place attack plane for the Army. It was known as the XA-9 and was later turned over to the Consolidated Aircraft Corporation for completion of tests and production.

As the Lockheed company saw that its planes were making good in the small transport commercial and sport fields, they turned to constructing larger high-speed planes and produced the highly efficient *Orion* Series 9. This type was a cleaned-up version of the *Sirius* and *Altair* models and was fitted with a higher powered engine than either of its predecessors. The *Orion* was a low-wing monoplane with a maximum speed of 225 m.p.h. and it cruised at 205 m.p.h. The wing span was greater than the *Sirius*, as was the length of the fuselage. The landing gear retracted and consisted of right- and left-hand units operated by a combination hydraulic and cable operating

A POPULAR AVIATION scoop are the photographs below of Lockheed's latest: the "14" or *Super-Electra*. Revolutionary on airliners are the Fowler flaps (inset).



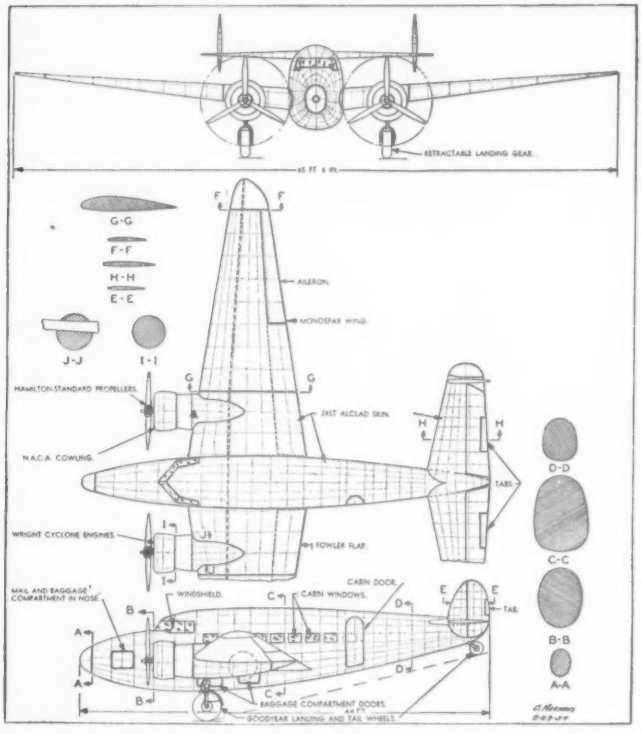
mechanism. The entire gear fitted into "wells" in the wings when in flight. The plane was powered with a Wasp engine rated at 420, 450 and 550 h.p. respectively. It could also be equipped with Cyclone engines, rated at 660, 650 and 760 h.p. respectively. Several *Orions* still are used on certain airlines and a few have been converted into racing planes.

In the spring of 1934 a new twin-engined twin-ruddered plane was produced: the *Electra*. This ship was developed primarily for airline operation that would produce the largest possible revenue on high-speed schedules. In design and construction, the *Electra* is one of the most advanced high-speed transport planes on the market at present. More than 100 *Electras* have already been constructed and are in use all over the world.

The *Electra* wing consists of three major parts: two outer panels and a center section. The ribs are constructed of light gauge 24ST aluminum alloy. The engine nacelles and retractile landing gear are placed in the center section of the wing. A baggage compartment with a capacity of 125 lbs. is situated in the upper surface of the center section near the body structure on each side of the fuselage. On the under surface of the trailing edge of the wing extending from the inbord and of the ailerons to the wing root are flaps that are electrically controlled from the cockpit.

The fuselage has three complete and three skeleton bulkheads for the framework, covered with stressed skin, as is the wing. There is a baggage compartment in the nose that has a capacity of 300 lbs. Ten passengers are accommodated with a crew of two.

(*Concluded on page* 64)



Laura Ingalls made a name both for herself and for Lockheed with her flights of a few years ago. She is shown above with one of her first Lockheeds, an *Air Express*.

• • •

SPECIFICATIONS OF THE LOCKHEED "14"

(Powered with two 850 h.p. Pratt & Whitney Hornets)

Top speed (full load at 6,700 ft.)	247 m.p.h.
Cruising speed (full load at 10,000 ft.)	217 m.p.h.
Minimum range (full load at 12,000 ft. at 222 m.p.h.)	838 miles
Maximum range (full load at 12,000 ft. at 222 m.p.h.)	2,125 miles
Absolute ceiling (full load)	23,100 ft.
Service ceiling (full load)	21,600 ft.
Landing speed (with flaps)	68 m.p.h.
Rate of climb (full load at 6,700 ft.)	1,235 f.p.m.
Wing span	65′ 6″
Length	44′ 3⅞″
Height	11′ 5½″
Weight empty	9,650 lbs.
Useful load	7,350 lbs.
Gross weight	17,000 lbs.
Maximum fuel capacity (3,900 lbs.)	650 gals.
Number of passengers	11
Crew	3

• • •

The Lockheed *Vega* below is known the world over as one of the most famous of airplanes. In this ship the late Wiley Post circled the earth and explored in the stratosphere.

Popping Them From the Air

by SPENCER EDDY

Photographs by F. Leland Elam

This is even more sport than it appears. The automatic shotgun is mounted on a specially designed free swivel. By learning to fly the ship one-handed, the pilot can hunt easily.

AIRPLANES as means of hunting furred and feathered pests are nothing particularly new in the West—except in point of magnitude.

Almost every predatory creature, ranging from boll weevils to eagles (and not forgetting mosquitoes), has been killed from the air in the hope of making democracy safe for the rural districts.

POPULAR AVIATION has carried these stories from time to time, and I particularly remember the story of the eagle hunt by Wiseman.

I am showing the present pictures just to introduce the idea of magnitude into the sagas of aerial hunting adventure. And to follow this thing up, I can even remember back about five years ago to the time when J. B. R. got bawled out by an Indiana game-warden for showing a plane covered with dead ducks!

But to get back to my particular job in this case, I wish to exhibit some photos of a man who is warring on pests in a big way. This is E. L. Torrey, who very effectively uses his plane to eliminate chicken hawks, coyotes, more hawks, more coyotes, more hawks and more coyotes, and so on. And the bounty collected by the industrious Mr. Torrey, is no small item as you can easily guess from the exhibits herein displayed.

To bag one or two chicken hawks in a day is a sizeable job for any full grown man, regardless of how big he may be or what sort of vehicle he uses for transportation and for the hunt, but Mr. Torrey thinks nothing of stringing up eight chicken hawks in one day and even then, he has a few hours left for the general purposes of work and recreation.

These aerial killers weren't fast enough for safety. They were "shot down" from the air.

He just levels the old gun across the cockpit, pulls the trigger and permits the laws of ballistics to have their own way about the matter. And then, be sure of it, something drops and that something is a bird or an animal that the country can well afford to lose. It is not only the domestic animals that are killed by these wild birds and animals that matters, but they also destroy useful birds that assist man on his war with insects and fungus plagues.

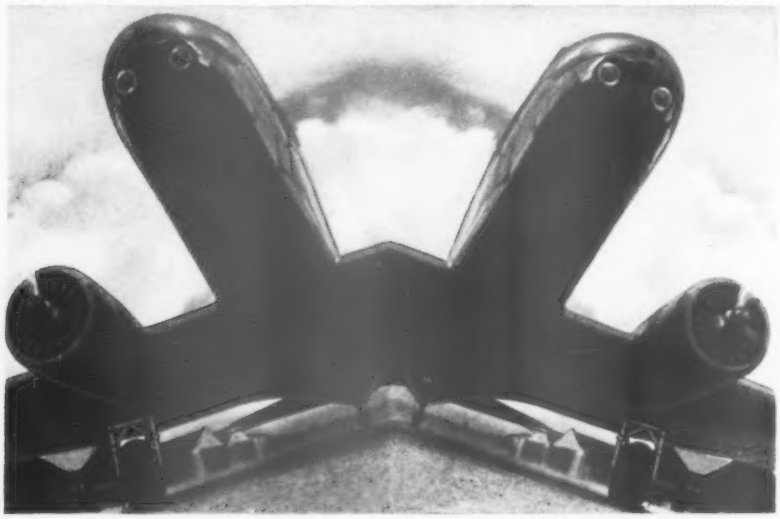
In a booklet published by the government, much is said in favor of the chicken hawk as an enemy of field mice and other destructive rodents with a parting paragraph stating that hawks only seek chicken yards after the mice and rats are cleaned up and that the hawks well earn the few chickens that they take. However, it is difficult for a farmer to believe this statement after half his poultry has been wiped out and so he boosts the idea of bounties for the benefit of public benefactors such as Mr. Torrey.

Mr. Torrey also exhibits an eagle of no mean wingspan—a bird that can carry nearly its own weight in the form of "live load." Many weird eagle stories have come in from the West, tales of attacks by the birds and so on, but it's easy to prove that they can be bagged from the plane. We need only to look at the picture.

Book-learning is one thing and experience is another, and it has been the experience of most farmers that the fewer the hawks the greater will be the number of chickens. Scientists may frantically declare that eagles do not steal lambs or calves, but as many a rancher has seen good lamb and future mutton disappearing skyward in the talons of an eagle, this rancher is still from that sovereign state of Missouri where skeptics require more than statements.

A little hedge-hopping combined with some nimble rudder work, and Mr. Torrey gets a sizeable bag of wolves and coyotes for his trouble. Note the wounds on several animals.

Boo, Dear Reader, Boo!!



Once again POPULAR AVIATION scoops the world! The two aeronautical goblins shown above and below were unearthed down in darkest Panama by an Army sergeant.

THESE astonishing monsters of this modern age were unexpectedly discovered by Sgt. J. B. Guss of the U. S. Army Air Corps at France Field, Canal Zone. Sergeant Guss writes that, during the course of his wanderings in search of photographic material one day, he suddenly came upon these monsters gnashing their crankshafts at each other. By using some means of pacification, however, Sergeant Guss persuaded the creatures to calm down long enough to let him shoot two of the most astonishing pictures of the age. In the upper picture the first monster is seen eyeing the sergeant's camera suspicously with its four eyes agleam. The brother (or sister) monster in the lower picture faces the sergeant with its tremendous jaws agape. But in face of all these terrors, the intrepid Army aviation man stood his ground. . . .

Oh well, if we must be serious you may as well know that these are just a couple of good "crazy" photographs of a Pan American Airways Douglas airliner. Sergeant Guss really is a camera-addict and he made these unusual views by reversing each photograph and reprinting it. The original of the upper picture actually consists of just half the entire picture shown above. Then the negative was reversed and printed again. The two prints were carefully pasted together and an engraving made of the entire layout. The same was done with the picture of the Pan American Douglas's two Cyclone engines below.

Four gigantic snouts pointed defiantly at the heavens, these aerial monsters actually fly! They probably will be named Gussius Gadgetus in honor of Sgt. J. B. Guss, their discoverer.

The Navy's Heroic Flight

ON the first news of the disappearance of the Earhart plane, the Navy dispatched one long range patrol plane under command of Lieutenant W. W. Harvey, U. S. N., from Honolulu to Howland Island on the possibility that the receipt of more accurate information while the plane was en route might pave the way for a rapid flight to a specific point for rescue.

This plane was to risk possible damage in landing and take-off in the open sea near Howland Island in order to refuel for its return flight to Honolulu with gasoline left at Howland Island for Miss Earhart which was just sufficient for the return flight of this one airplane.

The report which was made by the Commander of Aircraft Squadrons and attending craft, Fleet Air Base, Pearl Harbor, Captain Kenneth Whiting, U. S. N., follows:

"At 5:23 p. m. on Friday, July 2, Patrol Squadron Six sent one PBY-1 with a crew of eight to aid in the search for Fred J. Noonan and Amelia Earhart. The operation orders for this flight were as follows: Arrive Howland soon after daylight July 3 and search all day in vicinity of Howland, landing prior to sunset. Since no anchorage were available the plane was to tie up astern of the United States Coast Guard Cutter *Itasca*.

"The trip progressed very nicely, the night being clear for the start and continuing so until the morning hours. At 2:40 a. m. the plane passed directly over the *U.S.S. Swan* (aircraft tender on station for the Earhart flight) on course to Howland and a little over half way there.

"Shortly afterward, lightning began to appear in the south and southeast. About 5:15 a. m. we began passing through clouds at regular intervals all the way up to 12,000 feet. The electrical display got worse and we discontinued use of radio because of electrical discharges every time the transmitter was used.

"Ice began to form on the plane and even on the windshield about ¼-inch of ice was formed. It apparently formed in large enough pieces to break and be thrown against the fuselage by the propeller for the distinct sounds were noted.

"The automatic pilot became sluggish due to iced controls and at this time a descent was started, hoping to get under the storm. During the descent sleet was noted from 12,000 to 10,000 feet, snow down to about 4,000 and violent rain continued to the surface.

"The air bumps were of considerable violence. After about two hours of this, and continuously trying to find a way around, the flight was turned back.

"Because of the great amount of fuel used in climbing around the storm it became necessary to reach a decision whether to attempt to push further or return. After completing about 250

(*Concluded on page* 65)

Jimmie Mattern, Polar Explorer

by ROBERT McLARREN

The recent visits of Russian airmen to the United States will be repaid early next year when Jimmie Mattern flys his new Lockheed over the North Pole to Moscow.

FROM San Diego to Moscow! That is the prodigious undertaking of two intrepid American aviators.

Their's is the longest flight ever undertaken by mankind and as you read this, James J. (Jimmie) Mattern and H. S. (Hank) Jones are well on their way toward making aviation history. But history-making is routine operation to these flying Texans for they have the courage, ability, and foresight to carry them through to any goal which they might set.

Plans are now well under way for their projected record breaking flight. Met by the tremendous surge of popularity achieved by the two Russian ships, (particularly the second) which have successfully avigated the route, Jimmie Mattern and Hank Jones are determined to turn the tables.

However, neither of these men are interested in the publicity and fame which will be their just due. They are primarily concerned with proving to the world that the United States is unequalled in the construction of aircraft. Theirs will be the longest nonstop undertaking ever conceived and should, without doubt, convince every nation on the face of the globe of the superiority of American aviation products.

Their ship, *The Texan* is the fastest commercial transport available. It is the already famous Lockheed "12" series completely and specifically re-designed by Lockheed engineers for this flight. The cabin is fitted with six huge gas tanks and the four fuel reservoirs in the wings give this amazing craft a total of 1,130 gallons capacity. Each engine nacelle tank carries eight gallons of oil and the special nose tank of 30 gallons make a total oil capacity of 46 gallons. With this tankage, Hank Jones has estimated that the ship will be in the air between 45 and 50 hours.

Present plans call for a take-off at North Island Naval Air Station in San Diego Bay with about 600 gallons of gas. Ten hours later they will meet the refueling ship over Fairbanks, Alaska, which will pass to them 1,100 gallons while in flight. They will then strike out for the North Pole, having deviated somewhat from their 120th meridian course for the refueling.

They have been assured of the wholehearted cooperation of the Russian government. The Soviet Experimental Weather Station at the Pole will broadcast weather at half hour intervals and the powerful 500,000 watt station in Moscow will pick them up on the other side of the Pole and carry them in.

The Polar station, which was of such invaluable aid to the two recent Russian flights, operates on a carrier frequency of 170 kilocycles which is considerably lower than any in operation for the same purpose here in the United States. Therefore, their radio receiving equipment has been re-designed by the manufacturers to permit their using the Pole station.

They will wait at North Island for word from this most northern radio station of the weather and when the Russians give the word of favorite weather over the Polar regions they will get under way. It is interesting to note that the station was originally installed at the exact North Pole and since then has drifted some 500 miles south. This

This pair may make aviation history next year. That's Jones on the left, and Jimmie.

graphically proves the non-existance of land at or near that point.

Mike Benedum, Pittsburgh financier and famed Texas oil man is backing the project. "Spare no expense if it insures the completion of the flight in safety" were his orders and as a result more than $125,000 will have been invested in the ship alone when it leaves the ground.

Jimmie Mattern says: "I do not believe that there has *ever* been a plane which was as completely equipped as *The Texan*. We have had many conferences attempting to discover new things to install and we've got everything of conceivable aid to our flight in the ship."

A description of the record breaking craft would include complete de-icing equipment on wings and stabilizer and slinger-ring type on the propellers, complete automatic gyro-pilot, the most complete radio sending and receiving apparatus ever assembled in one ship, two Hamilton Standard constant speed propellers, radio direction finding loop, two Pratt & Whitney *Wasp Junior* series SB engines developing 450 h.p. each, and the newly designed exhaust gas fuel-air ratio analyzer, the first transport plane installation of this new device.

At present, a rate-of-consumption cylinder which will tell them automatically their gasoline mileage is installed and will be used on the shake-down transcontinental trip. Before the flight takeoff this will be removed after accurate figures on the rate of fuel consumption have been determined.

Jimmie Mattern's "office" is situated in the regular pilots' position on the port side of the cabin. Before him, above him, and on each side is a veritable maze of flight and engine instruments, radio equipment, wobble pumps, and over a dozen different valves of different shades. The entire gasoline tankage is connected into one system so that the fuel may be wobble-pumped to any point to trim the ship and so that the entire load may be dropped instantaneously. Six six-inch ports are located in the belly of the ship and aggregate fuel load, something over three tons, can be dropped in a few seconds.

Dressed and ready for the take-off Jimmie will look like a Kodiak bear for here's the picture from the inside out: suit of two-piece underwear, light blue broadcloth shirt with dark blue fore-in-hand tie, smart business suit, an English drape model with slight over-plaid, tan leather oxfords, blue silk hose and garters. Next comes the muck-a-lucks which are huge, fur-lined Alaskan sledsman type coveralls.

These are zipper equipped throughout and the large helmet type head cover is in one piece with the rest of the garment. These will be buckled tight around his ankles and the heavy, fur-lined boots will be pulled on. These will be securely packed with cotton and fastened to prevent the passage of air either in or out. On his head will be a regulation flying helmet with radio ear puffs.

Then comes the goggles and on top of this the radio earphones will be snapped into the ear puffs and onto the receiving set. The specially designed ear phones also include the inter-communication phone with which he will converse with Hank. By pushing a small switch he can listen either to the interplane phone or to the radio through the same ear phones.

His hands will be covered and secured by large Alaskan type fur-lined gloves in which the outer portion may be folded back leaving only small, finger-fitting leather gloves. With these he can manipulate the controls and under extreme cold he may pull the larger outer portion over his fingers. Over all goes the parachute

which, although cumbersome, awkward, space-filling and weight, is a very valuable safety aid.

A small, two-foot-square tunnel has been left open through the length of the fuselage and runs along the upper starboard side to the rear. Here we find Hank Jones, attired in much the same way as Jimmy, as far as outward appearance. However, Hank's conservatism will probably express itself in a dark blue serge suit, tie of dark hue, dark socks and black oxfords.

In his tiny office situated just to the rear of the cabin door he will have about two inches all over in which to move around. Hank stood nervously by the cabin door during the final installations at Grand Central Air Terminal in Glendale and groaned aloud as each item was carried through it. Each piece of equipment meant less comfort for him. As a matter of fact, his seat is the toilet cover which gives you a graphic conception of the crampness of his quarters.

To his right is the sending key and radio telephone with which he will spend much of his time letting an anxious world know of their progress. On his left is the trailing antenna reel and direction finding loop rotating handle. Up above is the automatic course plotter recently developed. A small panel folds down from against the huge gas tank in front of him and on it are pasted his valuable maps and plotted courses with which he plans to hit Moscow with a fraction of an error.

Above his head is a hatch. This opens down and inward into his compartment, a precaution realized necessary after hatches have blown off, crashed into tail surfaces and ruined many a record breaking flight. A small, retractable wind shield is just forward of this hatch. This can be raised and locked to protect him from the biting winds of the Polar areas.

To his right are the refueling ports with a small locking plate protecting them. Through this opening he will take his sights and obtain bearings. Of interest is the fact that he will use the same sextant Harold Gatty used so successfully on the famous Post-Gatty round-the-world flight. He will have the sun throughout the trip, our night being broad daylight near the Arctic regions at this time of the year.

Also through this hatch he will grasp the refueling hose lowered to him, place it in the tank lines and signal for the transfer. During this operation he will wear a large rubber covering on both his body and face to prevent painful burns from the high-octane gas should it blow on him either during or after the contact. Through this port, every one of the ten tanks throughout the ship can be filled at once. All radio receiving and sending antennas as well as the direction finding loop are located below the ship to prevent their being knocked off by the swinging refueling hose. There are no masts or projections of any type on the top of the ship.

This will be routine operation for Jimmie Mattern and Hank Jones for both

(*Concluded on page 62*)

Our Front Cover: The Luscombe Phantom

Though not so widely known as many other American aircraft, the Luscombe Phantom is one of the outstanding sport planes today. With a Warner engine, this ship sells for $5,500.

HAVING devised a new system of economical construction for airplanes, Don Luscombe left the Monocoupe company where he was president and chief engineer, and formed the Luscombe Airplane Corporation at West Trenton, New Jersey. Since that time, the Luscombe company has produced several versions of Mr. Luscombe's original design, the Phantom.

Though not so widely popular in American aviation circles as other sport aircraft, the Luscombe Phantom is one of the most outstanding ships in its field today. All metal and extremely rugged, the Phantom is powered with a 145 h.p. Warner engine that gives it a top speed of 160 m.p.h. at sea level. Possibly if an adjustable-pitch propeller were used (standard Luscombe practice is to install a one-piece fixed-pitch metal propeller) that performance probably could be increased.

With the exception of a somewhat novel tail assembly, the Phantom very closely resembles the Monocoupe. However, the new Luscombe system of construction consists of that company's restricting itself to the assembling of parts manufactured by outside firms that specialize in their manufacture. The company prepares the original design, then the dies, moulds and formers are then built up for the stamping companies to make the necessary parts from. These stampings then are returned to the Luscombe factory, where they are heat treated and assembled. According to Mr. Luscombe, this system keeps production costs down to a minimum.

The Phantom is a conventional two-place (side-by-side) high-winged cabin monoplane. The wings are all metal with fabric coverings as are the tail surfaces. The remainder of the ship is covered with metal. The fuselage is monocoque, somewhat like Lockheed design.

Cruising range of the Phantom is 560 miles. The Warner engine burns nine gallons per hour; total gas capacity of the ship is 33 gals. Cruising speed at sea level is 144 m.p.h., while stalling speed is 45 m.p.h. Also at sea level, the ship's rate of climb is 1,400 f.p.m. The service ceiling is 19,500 ft. With a payload of 630 lbs., the Phantom fully loaded weighs 1,950 lbs.

Wing span is 31 ft., overall length is 21 ft. and the height is 8 ft. 6 in. Total wing area, including the ailerons, is 143 sq. ft. The ship's 72 in. landing gear tread gives it excellent stability on the ground. This ship is also equipped with flaps. The Phantom also is licensed as a seaplane.

Meanwhile, it is reported that the Luscombe company soon will turn out a 90 h.p. ship much like the Phantom.

It is quite evident from the general design of the Phantom that Don Luscombe once was a Monocoupe designer and official. The Phantom, however, is bigger and also is all-metal.

A FAIREY "BATTLE"

. . . roars into a steep wingover in front of the camera as Flight Lieutenant Christopher Staniland of the Royal Air Force shows off this deadly British bomber's prowess. Heavily camouflaged in time of war, the *Battle* is said to hit 250 m.p.h.

ROME'S MODERN LEGIONS

GORDON SEAR WILLIAMS
reviews Italy's air rearmament

Here are a few of Italy's deadly Caproni bombers awaiting flight orders in Ethiopia.

ITALY'S present aircraft procurement program has produced many interesting and noteworthy ships, most of which are but little known in this country. Long known as a producer of fine flying boats and seaplanes which have seen world-wide service, Italy has now turned to record-breaking landplanes as well.

Present world's records now held by Italy include the speed record of 440.67 m.p.h. which was made October 23, 1934, in the Macchi-Castoldi M.C. 72 monoplane. It was powered with a double type engine driving two propellers and developed a total of 2,800 h.p. This same ship also holds the record for speed over 100 kilometers at over 390 m.p.h. and the half-hour's sustained flight speed record at 384 m.p.h. This sensational ship, incidentally, was one of the first to use the now well-tried symmetrical airfoil such as the Boeing YB-17 bombers and all other four-engined Boeings used.

Another record was set up when Colonel Biseo of the Italian Air Force flew a tri-motored Savoia-Marchetti landplane over a 2,000 kilometer course carrying 2,000 kilograms at 380 k.p.h. This ship, known as the S-79, is a low-wing transport equipped with retractable landing gear and using three Alfa-Romeo radial engines. A military version—the S-79B—is also in production and is equipped with two Gnome-Rhone K-14 radials. It was a ship of this type that competed with the Martin 139 bomber for Argentine Army contracts. The Martin was finally awarded the contract, although the Savoia-Marchetti S-79B was awarded the highest number of performance points.

An international record for seaplanes was won by the Cant Z-506 tri-motored monoplane. It used three Fiat *Hornet* engines, built under Pratt & Whitney license in Italy. This trim all-wood ship carried the rather paradoxical license identification letters "I-CANT" but in spite of this undue pessimism it carried its load over the specified distance at over 200 m.p.h. It has attained a maximum speed of 226 m.p.h. in level flight.

The latest record to be broken by Il Duce's flying army was shattered on April 1 when a standard Breda 88 twin-engined military bomber-fighter monoplane flew over a 100 kilometer course at an average of 321 m.p.h., and over a 1,000 kilometer course at about 295 m.p.h., truly a remarkable performance. This ship is a standard all metal twin-engined ship furnished in number to the present air force in Italy and uses two radial engines developing a total of over 1,500 h.p. This record is the more unusual in that it was made with a wholly standard military machine.

Although the Breda 88 is still on the

Romeo gull-wing fighters like this RO-41 are an important part of Italy's aviation army.

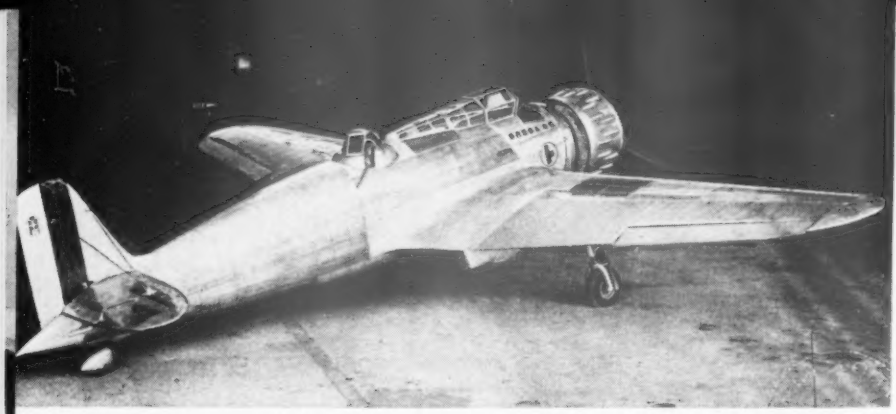
HURL WORLD CHALLENGE

A Savoia-Marchetti S-81 tri-motored bomber returns from a flight over Ethiopia.

secret lists, it is really a development of the smaller, single-engined "64" and "65" Bredas used in quantity for some years. These two ships are in themselves quite noteworthy. The "64" was designed as a light bomber or two-place fighter while without armament could be used as a fast mail carrier for long distance hops. In the military version it carries five Breda-Safat machine guns; four in the wings firing outside of the propeller arc, and one on a flexible mount in the rear cockpit. Two of the wing guns are provided with remote control so that the pilot may elevate them through 10 degrees of fire for ground-strafing or attack work. Due to the high speed of the ship the traversing movement of the rear gun ring is accomplished by hydraulic means. Internal bomb stowage is provided for four 100 kilogram bombs and extra racks may be installed on the under surfaces of both wings. The wings are of all metal construction and the fuselage is of welded steel tubing, having metal sheeting on the forward sections and fabric to the rear of the cockpits. Light armor is provided around both cockpits, but of just what type this is has not been disclosed. The 650 h.p. Alfa-Romeo 9 cylinder engine gives the Breda 64 a maximum speed of 217 m.p.h. at 13,120 ft. and a ceiling of 23,000 ft. For use as a long range bomber an extra gas load in the normal bomb bay enables it to cruise for 1,240 miles.

As a further development of the "64," the Breda 65 has appeared. It differs but little in general appearance from its progenitor but many new design innovations and a more powerful engine give it a much higher speed. The wing in this model is of a composite structure, the forward section being metal covered, while the trailing edge is covered with fabric. Spars are of chrome-

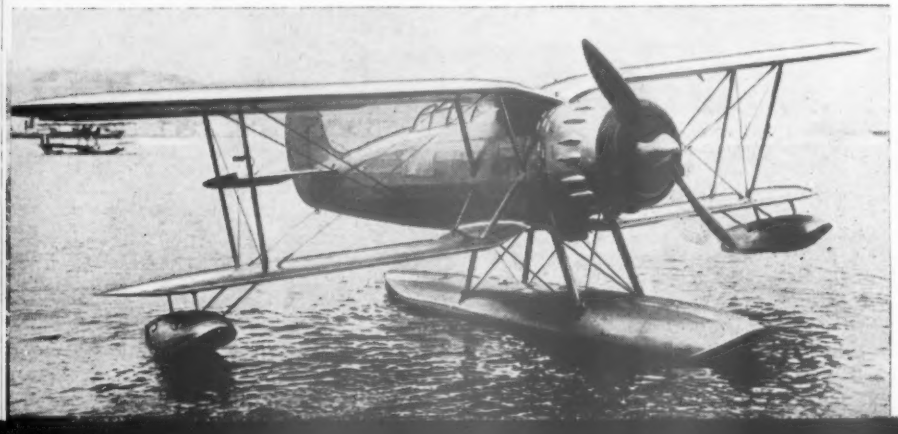
This older model of the S-81 at the top of the page also saw service. Note retractable bomber's pit.



This Breda "65" pursuit-bomber is said to have a cruising speed "of about 300 m.p.h." Note retractable landing gear and novel gun turret. The power of the 14-cylinder engine is secret.

A standard fighter in the Italian air force, this Fiat biplane has a rated top speed of 249 m.p.h. Powered with a 700 h.p. Fiat engine, this ship was used recently in Ethiopia.

Italy's long distance over-water military missions are carried out by boats like the Cant Z-501 above. With a 1,500 mile range, cruising speed is 132 m.p.h. The Romeo "43" below is an Italian shipboard catapult plane. The main gas load is carried in the pontoon.



moly steel and have the wing ribs attached directly to them, being very closely spaced. Cruising speed of this potent light bomber-fighter is reported by Italian authorities to be 300 m.p.h.

Other interesting types being used in Italy's air force include the products of the Romeo factory, formerly a Fokker licensee for Italy. This company has now abandoned foreign designs and is producing many noteworthy and original ships. The RO-37 is supplied in two forms; with a 700 h.p. Fiat water-cooled engine or with a Piaggio radial of the same horsepower. This ship is a conventional two-place biplane fighter-observation ship and has a top speed of 209 m.p.h. Two Breda-Safat machine guns fire through the propeller arc and one is flexibly mounted for the rear gunner. Racks for 12 bombs of 15 kilograms each are provided on the lower wings.

Romeo also produces a single-seat fighter of gull wing type, the RO-41. It uses a 390 h.p. Piaggio radial engine enclosed in a wide N.A.C.A. type cowling and attains a top speed of 208 m.p.h.

Another gull wing biplane in production for the Italian air force is the Romeo RO-43. This job, a two-seater, is used in the Naval air arm and, as normally supplied, is mounted on a single float and is powered with a Piaggio radial of 700 h.p. Top speed is 198 m.p.h. An interesting feature of this ship is the use of the pontoon to carry part of the fuel load. The RO-43 is designed as a catapult ship and is provided with folding wings.

These various recent Italian ships are all up to the latest in use in this country as well as the various nations of Europe.

But, as time progresses, Italian aircraft manufacturers show more and more individuality and ingenuity. Modern Italian warplanes are among the world's best. Breda, Caproni, Savoia-Marchetti, Romeo, Fiat—all of them old reliable companies who have been in the business for years, are turning out new designs that compare most favorably with any airplane of the same type produced anywhere else in the world.

Italian warplanes are playing an important role in Spain today against American, Russian and French machines. Their excellence in stamina and performance has been proved many times over Spain's rebel and loyalist fronts. However, Italy's modern aircraft received an outstanding test in the recent Ethiopian campaign despite the fact that there was little or no opposition from the Africans. Long range reconnaissance and bombardment flights were made. Supplies were flown up to besieged Italian troops. In fact, practically every possible duty the airplane could be put to was done by the Italians in Ethiopia. It was there that Mussolini's airmen learned what their warplanes lacked so far as actual wartime operations were concerned. And the Ethiopian "proving grounds" has done much toward making the newer Italian fighting and other military aircraft among the best in the world today.

END

"....Clear and Unlimited"

by SWANEE TAYLOR

It appears that four persons died in the recent airliner crash in Florida because of the gross negligence of a power company. Swanee lashes out at them tellingly.

Municipal Mismanagement . . .

How many, O Lord, how very many more lives are to be beaten out against the ground before the people of this land will be aroused to the hazards in flying caused by incompetent and/or slovenly municipal airports managements? So many of them know *so* little . . . so many care less!

I don't know who was directly responsible for the appalling accident at Daytona, Fla., which killed two superb pilots and two passengers and shattered Eastern Air Lines' splendid record—Aviation's proudest achievement—of 151,000,000 passenger miles without a fatality. But I do know that the world suddenly felt awful sick in the pit of its stomach when the news broke.

This is written on the day it happened. and your devoted correspondent still feels that icy lump amidships that makes a fellow want to yerp. Therefore, he will probably write with a pained bitterness, and much more unintelligently than usual. If it is unduly sour charge it, please, to a deep sense of personal grief. For, I find it impossible to see the hard-earned fruit of Eastern Air Lines' magnificent efforts mowed down in a trice without wanting to cry my eyes out.

Aviation deaths, as this column has frequently pointed out, are invariably the result of human error—somebody forgot to remember. And with the Daytona tragedy one hitherto unnoticed angle rises to jab us in the ribs; I mean the brand of management usually found at city-owned airports.

Don't go jumping at conclusions, now; I certainly am not trying to place the blame at the feet of the Daytona management. This department never sits in judgment hundreds of miles away. What I'm getting at is that the Florida thing brings an unhappy situation into sharp focus, at long last. (Although I must, in simple justice to the cause, remark that should I ever see lights bobbing around in the dark at one end of my airport I'd darn sure get up off my stern and find out if they were stringing an electric line down there or what.)

Of course some people I can think of will holler like stuck pigs when this is printed. However, they are the kind of people I have reference to, so everything will be just dandy. In fact, their agonized squeals will tend to center some more attention on their many deficiencies and thereby be responsible for a citizens' revolt against a truly insufferable condition. Pretty nearly any steps are justifiable which will exterminate the chinch-y little ward-heelers holding jobs at municipal flying fields in return for serving some two-bit district leader in the capacity roughly on a par with that of Dan, Dan the Lavatory Man.

Though it's too late to rectify this wrong, Swanee grieves over Eastern's accident.

To illustrate my point let me tell you about the time when I was landed in on a certain great big municipal airport just about 90 degrees cross-gale. And simply because the little termite in the tower was too gol-ram lazy to glance over his shoulder to get the wind direction. Another one insisted that the pilot come in down-wind at night, thus jeopardizing expensive equipment and a ship load of lives. For why, I never knew. Still another time the precocious tower twerp couldn't be bothered answering our in-bound pilot .and we too narrowly missed collision with another airliner taxing out for take-off.

The instances recited above, to be sure, were corrected automatically when Airways Traffic Control took over. Nonetheless, the puny little job-holders (most of whom kick back half of their salaries to their bosses), still hang around the fields steadfastly shirking responsibility, duty and above all work.

This airport's situation is another excellent argument in behalf of lumping all civilian air operations under one non-political Federal agency, preferably under a Department of Aviation. Else under the safe and sane Interstate Commerce Commission. But whatever the jurisdiction, it must be free from the destructive influence of politics. Also, the set-up should be such that a young fellow could start at the bottom and carve himself a career in that branch of human endeavor.

Municipalities that consistently make horrible botches of anything more complicated than sewerage disposal are not the agencies to guide a swift-moving, dynamic enterprise such as flying. Let them, if they must horn in, attend to the matter of policing the grounds, but let it stop right there. For, a city government is supposed to provide its citizenry with protection, recreation and sanitation—not a single thing else.

How many, O Lord, how very *very* many more lives are to be beaten out against the ground before etc., etc., etc.!!

Hot Words Sans Mustard . . .

I've had to fire a couple of my hitherto reliable secret operatives for the very stupid piece of sleuthing they did in the Long Island Aviation Country Club Case. You will possibly recall that two columns ago I carried rumors to the effect that some of the L. I. A. C. C. membership was in snobbish opposition to the proposed Intercollegiate Flying Club Meet to be held on the club's field.

Well, I've got to eat up those words without mustard or relish, something I'll do gladly after you've read a letter sent forward by Jimmie B. Taylor, Jr., the old power-diver.

> The Long Island Aviation C. C.,
> Hicksville,
> New York.
> Gentlemen:
>
> On behalf of the National Intercollegiate Flying Club, I wish to thank the members of the Aviation Country Club for the privileges and kind cooperation given us during the Collegiate Meet.
>
> All the pilots seemed to take special delight in this year's meet, and all of this I am sure is due to your fine cooperation and hospitality.
>
> Sincerely yours,
> (Signed) C. D. Martin, Jr.
> President.

Spasmodic Report . . .

From time to time little thumbnail reports will be furnished to the clientele with the point in view of keeping you informed as to the state of flying affairs in this country and elsewhere. What you do about the various conditions and circumstances is purely up to you; I'm merely reporting.

Oberlin, Ohio: Bob Jelliffe, of this city, writes: ". . but I, even though I am ordinarily very placid, get excited when I read a statement like the following in a nationally circulated magazine: 'Aviation Post 257 of the American Legion, Detroit . . . to suppress the homemade plane activity'. The best reason they have to offer is that such activity *may* result in accidents.

"Personally, I hate to see the boys de-

prived of the sport of building their own planes. It looks as if the big money wants to do all the building . . . and they say this is democracy!

"Maybe I don't read the right newspapers but I haven't seen any headlines about 'Homebuilt plane crashes'."—*Nor has anyone else, Bob. But don't worry, if Aviation Post 257 starts tip-toeing through life. It means that they're getting old, and they won't be up and around much longer.*

Cleveland, Ohio: A new low in bloodthirstiness was struck when the national Air Races, Nero's pet envy, announced that a seaplane had been engaged to do low altitude acrobatics at the 1937 show.—*The poor sap pilot didn't realize that he was merely a burnt offering on the altar Gate Receipts.*

Washington, D. C.: Happier and more encouraging news comes from the Nation's Capital with the first-half report of Leighton W. Rogers, president of the Aeronautical Chamber of Commerce. It states that $22,500,000 worth of airplane deliveries were made during the first six months of this year. And nearly fifty per cent were in commercial types.—*A grand job Leigh Rogers is doing in a ticklish town. The Industry is finally beginning to appreciate the work of its Cham. of Comm.*

Chicago, Ill.: American Airlines brings us the joyous news that the system set an all-time record for the month of June. They carried exactly eight people less than 31,000 during the month of marriages.—*Proving, perhaps, that the airlines of this country can serve the public profitably without having to take any more bullying from the Post Office Department.*

Panama, C. Z.: Observers here failed to hear even a murmur of complaint from the corporate lips of imperial Pan-American Airways about the expense of searching for one of their ships, even though the Navy sent two submarines to join the search.—*It's okay to search for a "commercial" ship that's down at sea, but if you are Amelia Earhart or anyone else the procedure quickly becomes a burdensome expense.*

New York, N. Y.: Further abuse of the rights of the private flyer is exemplified in the latest ruling at Floyd Bennett Airport (a municipal enterprise), wherein everybody has to get down out of the air for three set periods during the day when airliners land there. This includes, of course, citizens and taxpayers of the city of New York.—*Three cheers, though, for the Private Flyers' Assn., which is the only organization which is putting up a fight for our freeborn right to pursue life and happiness aloft as well as afoot and on horseback. Write Bill Brinckerhoff, care Brown Crosby & Co., 96 Wall St., N.Y.C., about how to join this swell organization. More shock troops are needed to carry on the battle into enemy territory. So if you've the guts to fight for your rights, join up immediately.*

Chicago, Ill.: Pres. Dave Behnke, of the Airline Pilots' Assn., maintains that his association is firm in its ultimatum on Washington-Hoover airport It must be

(*Concluded on page 72*)

At Last—A Low Priced Sextant

NAVIGATORS or "avigators," as the air-minded division is now known, still rely to a very considerable extent upon the sun and stars for determining their position on long flights over uncharted courses.

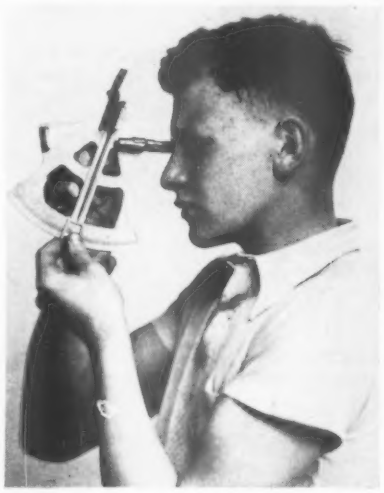
As long as the sun is up, the avigator will point his sextant toward it to check his position, even though the radio compass may be on the job. When the sun disappears below the horizon, the avigator will take in such known reference points as the stars Arcturus, Polaris or Betelgeuse. All of this science was developed long years ago by navigators in the marine service, but the basic principles are applicable to any means of travel so long as we can sight our celestial references.

But—until recently, sextants have been very expensive instruments, out of the reach of the average pilot and student. And, again, the text-books explaining the operation of the sextants have been so highly technical and mathematical, that a full understanding of their use required attendance at a school of navigation. These two conditions account for the scarcity of sextants in aviation, even in the equipment of commercial airline operators.

By the recent introduction of the Boyce-Meier sextant, the way is opened to the study of the sextant by the average pilot. Its low cost puts it within the reach of every student, while the very concise booklet of directions that accompanies each of these instruments, makes it possible to operate the sextant without entering into the study of higher mathematics. This instrument is not a toy, but has been so simplified that it can be used after a few hours' careful reading.

The Boyce-Meier sextant is strongly made of non-magnetic metal so that it will not affect the compass of the plane in which it is used. It is provided with a graduated scale and vernier that will read within the practical limits of 1/20 degree, has a well silvered index mirror,

Measuring horizontal angles.



Shooting the sun with the new sextant.

a plain tube telescope, horizon mirror and artificial horizon. Adequate celluloid sunshades are also provided, and the price of the instrument includes the instruction book and table of declinations.

Our illustrations show how the instrument is used in a vertical plane for sighting the sun or stars, or in a horizontal plane for determining horizontal bearings. In the first case, the instrument is used for determining your position on the earth's surface. Used in a horizontal plane, it can be used for mapping, for surveys or for measuring objects otherwise inaccessible.

In "shooting the sun" with this instrument, the sextant simply measures the angle between the horizon and the sun at that particular time. This angle is then subtracted from 90-degrees and a quantity found in the table, corresponding to that data, is either added or subtracted from the first remainder. The final result is the latitude at which you are located. Very simple arithmetic that can be handled by anybody.

Just for the fun of the thing, let us quote one of the examples given in the instruction book. This practical application of the reading will be clearer than volumes of descriptive matter.

EXAMPLE: Let us say that the angle of the sun, as determined by your Boyce-Meier sextant is 38°-48′ on March 1, 1937. The 90° angle is changed to 89°-60′ for the purposes of subtraction and then we subtract:

89°-60′ (Equivalent of 90°)
38°-48′ (Measured angle of sun)

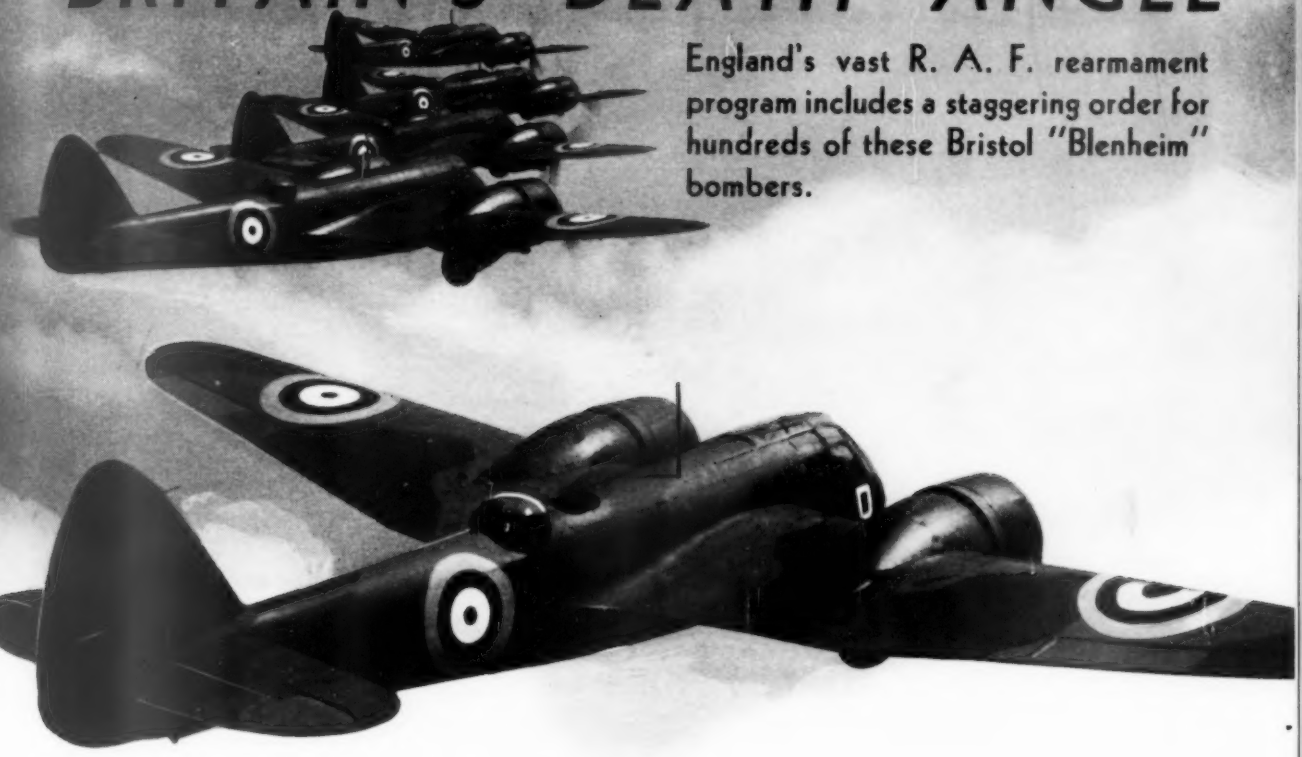
51°-12′ (Difference between 90° and sun angle)

We now turn to the table of declinations and find that the apparent declination on March 1, 1937, is —7°-32.9′. The minus sign (—) means that this amount

(*Concluded on page 61*)

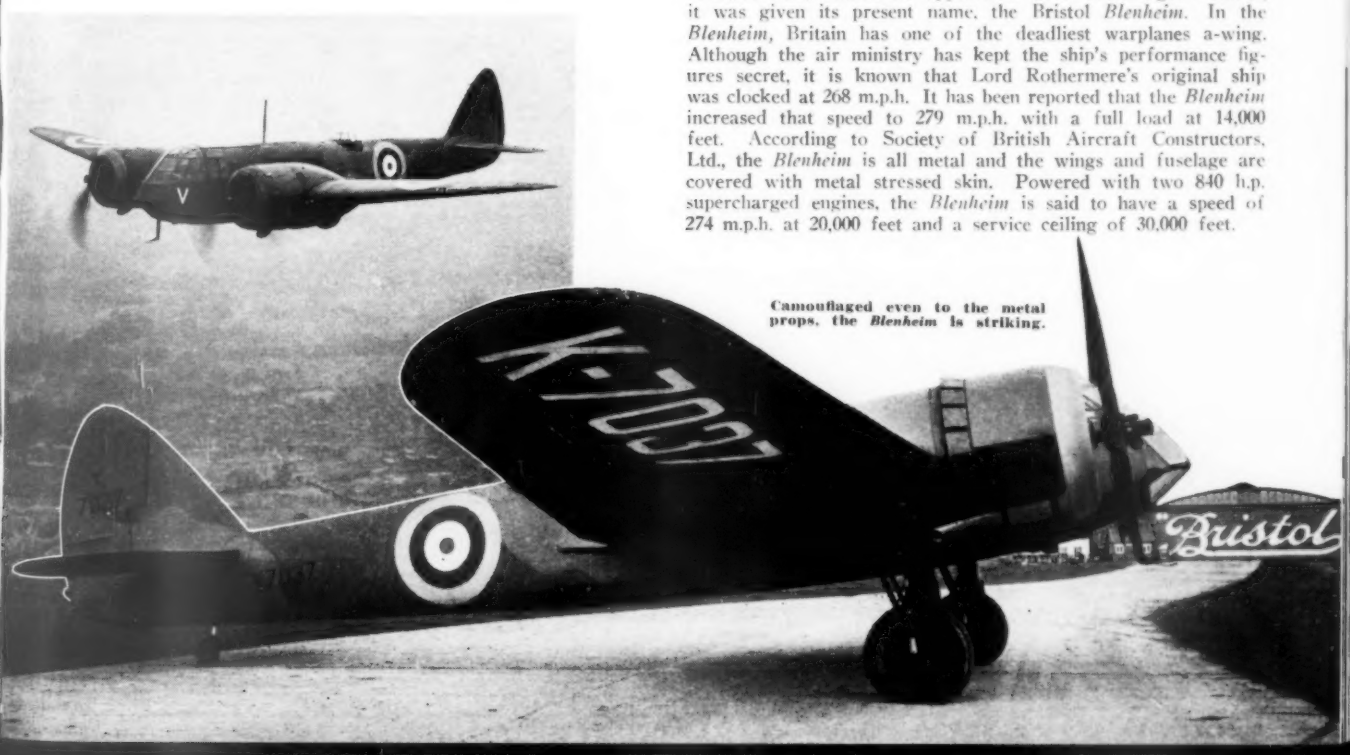
BRITAIN'S DEATH ANGEL

England's vast R. A. F. rearmament program includes a staggering order for hundreds of these Bristol "Blenheim" bombers.



Capable of flying 1,000 miles non-stop with a full load of bombs and armaments, the *Blenheim* is by far the deadliest airplane of its kind in the British empire today. Several hundred now are under construction both at the Bristol factory and a "shadow factory."

IF Lord Rothermere of Great Britain had not wanted a high speed transport for his own personal use, England may never have had the deadly bomber she has today. It was 1934 that Lord Rothermere contracted with the Bristol company for a high-speed twin-engined airplane. The Bristol company dubbed its design Model No. 142. Rothermere liked the name "Britain First" better. Later, however, when the refined version of the "Britain First" made its appearance as a full-fledged bomber, it was given its present name, the Bristol *Blenheim*. In the *Blenheim*, Britain has one of the deadliest warplanes a-wing. Although the air ministry has kept the ship's performance figures secret, it is known that Lord Rothermere's original ship was clocked at 268 m.p.h. It has been reported that the *Blenheim* increased that speed to 279 m.p.h. with a full load at 14,000 feet. According to Society of British Aircraft Constructors, Ltd., the *Blenheim* is all metal and the wings and fuselage are covered with metal stressed skin. Powered with two 840 h.p. supercharged engines, the *Blenheim* is said to have a speed of 274 m.p.h. at 20,000 feet and a service ceiling of 30,000 feet.



Camouflaged even to the metal props, the *Blenheim* is striking.

Wings Across The Seas

Today, ten years after a lone airman nursed his rickety airplane across the Atlantic to everlasting fame, huge airliners now wing. . .

The public turned out en masse as the big Britisher was prepared for her U.S. debut.

A few short hours and the first of His Majesty's ocean-spanning airliners gracefully touched her hull on American waters. *Caledonia* is shown above at the end of her flight.

LONG before the Pacific, Juan T. Trippe wanted the Atlantic. But Trippe's far-sighted plans for his Pan American Airways were successfully stymied by "competing" foreign nations (England, Portugal, et al.). So, instead of devoting his major energies toward overcoming the Atlantic pitfalls, Trippe turned his company westward.

With Pan American's success in Pacific operations assured, Trippe again turned to the Atlantic. By this time Portugal had agreed to give the Americans landing rights tentatively planned at the Azores and possibly Portugal itself. This was—and probably will be—the summer route of the trans-Atlantic airliners of England and America. Britain, meanwhile, noting the success of the Americans in the Pacific and the willingness of the Yankees to cooperate on the Atlantic, gave in. Gave in, that is, to the extent that landing rights on British territory would be granted if, in turn, the Americans would grant the Englishmen the same privilege. Boiled down, it meant just what we are seeing today and what the photographs on this and the opposite page signify: the Americans must "cut in" the English or not fly the route at all.

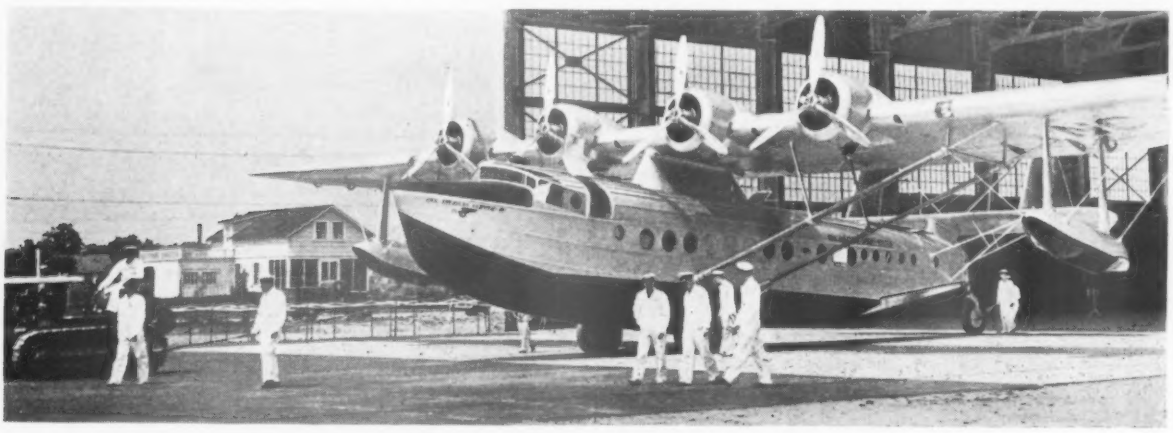
When the agreement "cutting in" the British finally was closed, that country's air ministry immediately announced that orders for a large fleet of four-engined flying boats had been given to Short Brothers, famed old-time British airplane builder. The *Caledonia,* shown in the accompanying photographs, is one of the Short Empire boats, as they are technically known.

But, though the British were entering a virgin field by comparison to Pan American, the Americans already had had years of experience at long-distance over-water flying. Nonetheless, the Americans were forced to hold up their long planned flights to Bermuda and England until the Short boats could be completed. If it hadn't been for these delays, the Americans could have been flying the Atlantic three years ago.

(*Concluded on page* 66)

Meanwhile, America's role in this historic aerial drama was ably done by one of Pan American's reliable Sikorsky S-42B Clippers (below).

It was a Sikorsky like this that pioneered the Pacific, the route to New Zealand (soon to be opened), Bermuda and recently the North Atlantic.



"CALEDONIA" BY SHORT BROS.

The first British trans-Atlantic airliner salutes New York City after an uneventful inaugural flight from England.

I Fly the Hammond "Y" and . . .

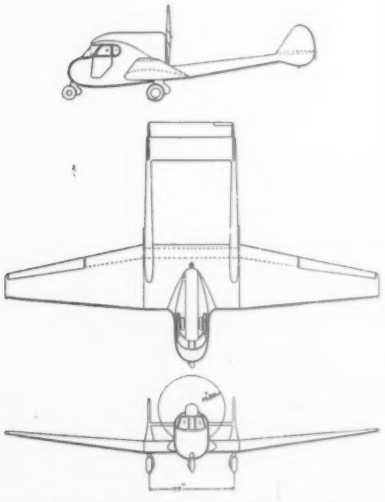
by Swanee Taylor

Here is the latest version of what probably is the most disputed airplane in the country. But the Hammond is gradually proving itself and has now sold itself to Swanee Taylor.

EMERGING at last from the claws of the Bureau of Air Commerce, the Stearman-Hammond Y has been launched upon the serious business of commercial sale. And if I may be permitted to report on the little ship I will do so and take the added step of making a bold prediction.

It hardly seems necessary to mention that I embarked on this flight with an open mind, even as would any other pilot in the world. But there have been those in the past who decided that I was agin' anything and everything new because I revolted against the hilarious publicity emanating in the past from the Bureau of Air Commerce. Therefore, I say that I climbed into the ship exactly in the same frame of mind any other pilot would get in a new type of aircraft. You know, let's see what this baby girl will do!

In the first place the ship on the ground is nothing short of a long sweet dream. You steer it with the wheel, taxi it around like a jack-rabbit if you want to with no ill effect on plane or personnel—the passenger's blood pressure excepted.



Three-view plans of the Hammond.

They tell me, incidentally, that quite a few pilots who have ridden with Tommy Fowler get mad at him and want to fight at the way he taxies across the field. But, at any rate, here at last, is an aircraft that runs along the ground according to the time honored acceptance of the principals of locomotion.

As we all know, the angle of attack is two degrees negative while the ship is on the ground. Which means that she is to be rocked back into flying posture. You can run her clear across the airport with full gun and she won't fly off the ground as will ships with a positive angle of attack. It should be added that use of flaps will help a lot in breaking her off the ground.

This is about the only disadvantage I can see in the ship. I will add quickly though that possibly it's a blessing. But to me it was a slap in the face to my instincts. (Remember, please, remember I am only reporting.)

For the first little while you are in the air your feet go nuts for a lack of something to do. Your mind, those instincts I spoke of, even every pore in your body screams for something to kick at. You bank timidly and become terrified when she starts making a turn. None the less, a piercing glance at the bank-and-turn indicator tells you that everything is sweet as a nut. So you lift the wing and try the other direction. Meanwhile your feet are itching like Bill Robinson's itch when that St. Louis ev'nin' sun goes down.

You fly the ship around for a while, making steeper and steeper banks 'til you have got her cocked up straight on her ear. Above 45 degrees the turns are even better than at shallow angles. Of course, there is no way to hold her nose up in a vertical bank and here again your foot goes mildly mad. However, there is but the faintest loss of altitude in vertical turns. Certainly only

(*Concluded on page* 60)

American Gas Model Wins

AN American gas model, equipped with an American engine, recently soared for one hour and 20 minutes from Etamps-Mondiser, France, to win the cup of the Model Air Club of France.

Owned and flown by Raymond Levy, student in an aviation mechanics' school, the little Baby Cyclone-powered *Red Zephyr* was lost from view in the clouds after flying for about 19 minutes. It had attained an altitude of about 4,000 feet at the time. The villagers of Echainvilliers (Loiret) saw it descending in regular circles above the town some 60 minutes later, thought it a real airplane because of the stable regularity of its flight. It landed in this village on a roof top, 80 minutes after taking off.

At the time of take-off, it had carried 120 cc's of fuel. There were 24 cc's remaining when it landed and it was found that the motor had stopped due to a broken spark plug.

Enthusiasm created due to the French meet was very great, as gas model flying in that part of the world is new. The Motorcycle Club of France collaborated in finding any little airplanes that managed to get away from the field.

The New Universal Mike

UNIVERSAL MICROPHONE CO., Inglewood, Cal., has just started to produce and market a new aircraft microphone that is outstanding for compactness and light weight.

It is announced as 100 per cent directional and all extraneous noises are excluded. It may be held in the hollow of either hand and a rugged push button can be operated by the thumb while the pilot or radioman holds the instrument in the palm of the hand.

There is a double contact switch, one side of which closes the circuit for microphone current and the other side operates the relay for throwing the transmitter into action.

The aircraft microphone is molded bakelite, with shielded cable, and is single button.

The Universal aircraft microphone.

FREIGHTER OR FIGHTER?

If this Bellanca is to remain a strictly commercial plane, military aviation experts are missing a high speed, long range air bet.

JUST as a matter of speculation, if nothing else, let us suppose that the 20 Bellanca 28-90 mailplanes shown here are not actually intended to fly mail. To start with, these commercial versions of the ship James Mollison flew across the Atlantic in October of 1936 were ordered by the national French airline to be used as mailplanes, though it's a little difficult to understand why France suddenly needs high-speed, long range, two-place American aircraft to carry nothing but mail over in France. Nonetheless, that's the story and they're sticking to it.

Now for the speculation. For military purposes this fleet of Bellancas definitely "has something." Figures released by Bellanca show the 28-90 to have a cruising speed at 6,200 feet using 75 per cent of the *Twin Wasp* engine's available 900 h.p., of 250 m.p.h. Top speed at the same altitude with a full load is 280! Now suppose that 1,060 lb. payload were converted to a cargo of bombs and ammunition. Or supposing just plenty of ammunition was carried and the remaining part of the payload was taken up by additional fuel. That gives us a different picture.

With the new Bellanca equipped as, say, a long-range fighter or attack plane, the second member of the ship's crew might be eliminated and his weight (170 lbs.) and 100 lbs. of the payload given over to machine guns and ammunition. The remaining 960 lbs. could be turned over to gasoline. With this imaginary conversion made, the Bellanca 28-90 would have a cruising range of 1,803 miles at a cruising speed of 250 m.p.h.! In addition, the ship has a service ceiling that would give the majority of present-day military aircraft something to shoot at—30,500 feet! And even fully loaded, the 28-90 might even serve as an interceptor fighter, for it can climb 2,173 f.p.m. all the way up to 15,000 ft.! . . .

As previously stated, this latest Bellanca is the up-to-date version of the Mollison trans-Atlantic flight. It also is the latest development of the ship that originally was designed and built by Bellanca for Col. James Fitzmaurice, famed Irish airman. Fitzmaurice, it will be recalled, intended flying this ship in the London-Australia air race.

The 28-90 is a typical rugged Bellanca. Through a novel arrangement of flying and landing wires, a typical Bellanca high-efficiency wing has been used. Wing ribs are closely spaced and the whole wing is fabric covered as is the steel fuselage. The fuselage from engine to rudder is an almost perfect streamline form. All cargo and fuel is carried in the fuselage. Just behind the engine there is a large cargo compartment that could easily be converted to additional gasoline space. Just behind the cargo compartment are the ship's standard fuel tanks that carry 150 gals.

The landing gear is of especially noteworthy design. With an exceptionally wide tread and the added feature of a fixed tail wheel, the 28-90 is unusual in its ground-handling stability. The full retracting gear is operated by a hydraulic mechanism.

The National Air Board Says . . .

Alexander Klemin, chairman

Though air bases like this Pan American terminal are comparatively numerous, the private or amateur flyer has been relegated to smaller, more dangerous out-of-the-way fields.

AT its 15th meeting the Air Board had the pleasure of welcoming William W. Brinckerhoff, secretary of the Private Flyers' Association, which is newly organized and full of promise and energy. The Association provides an airport directory for its members, lays out cross-country trips by air and has undertaken a task which is closely analogous to that of the American Automobile Association. With prominent officers and directors who are residents of many states, the Association will also keep a close watch on anything done in Washington which may affect the interests of the private flyer.

Should Private Flyers Use the Airports?

With Mr. Brinckerhoff leading the discussion, the Air Board first took up the subject of the new air traffic regulations which are being discussed by a special committee of the Department of Commerce. This committee is debating such important points as the width of the officially recognized airway and whether this should be 25 or 50 miles. Also under debate is the rule that all airplanes should be equipped with blind flying instruments and with two-way radio if they are to be permitted to land at an airport of importance, or to use the airways. With the ever-growing density of traffic, additional precautions must indeed be taken. But it would be a tremendous hardship to owners of private planes or to charter operators if they were exposed to excessive regulation. At a certain New York state airport, so the Board heard from one of its members, the official in charge of the control tower would not let a man take off for his summer camp 40 miles off without the submission of a flight plan.

After considerable discussion the Board came to the conclusion that the following suggestions were worthy of consideration by the Department of Commerce:

1. On certain very busy airports and airways, specifically designated, no flying should be permitted without instrument and radio equipment equivalent to that of an airliner.

2. On other airports and airways, planes would be kept off only under conditions of zero-zero weather, unless provided with these instruments.

3. The rules should not be inflexible, and the men in charge of traffic regulation should study circumstances and the general good of the whole industry, rather than to seek to benefit solely the air transport operators.

Radio Waves and the Homing Pigeon

The Board is catholic in its interests, and immediately after this earnest discussion of traffic regulation it passed on to a topic which may well be a source of mild amusement. The Navy maintains a loft for homing pigeons at its Lakehurst Air Station. When these pigeons are released at Ocean Gate, N. J., a distance of some 12 miles from Lakehurst, they circle for about five minutes and reach their loft within 19 to 21 minutes. But while the radio station at Ocean Gate is transmitting, the pigeons act in a confused and erratic manner for ten or more minutes and only reach Lakehurst in from 42 to 52 minutes. No definite explanation of this curious phenomenon is forthcoming, but Captain Brooks, well versed in electrical matters, hazarded the following conjecture:

Medical men now employ a new form of treatment in which certain diseases are fought by the artificial production of fever. But the patient is not packed in a hot box; he is subjected to intense oscillating electric currents which influence his system powerfully. The technical name for this treatment is "diathermy". Is it not likely that the radio oscillations affect the nervous system of

(*Concluded on page* 68)

New Aerial Camera

ALTHOUGH in appearance it is similar to the Model A Skyview, the Model D is slightly larger and has many added details which make it unique. Its versatility is a new and most attractive feature in a camera. The Skyview Model D opens limitless possibilities, broadens immeasurable the field of photographic opportunity. Never has there been available in one piece of equipment such wide range of capability.

With the Model D, which is a focusing type camera, critically sharp negatives are made as close as five feet. Varying shutter speeds and a simple focusing arrangement make the Model D capable of doing excellent work of any type. For air work, the focusing mechanism automatically locks in place when set and remains so until released by hand.

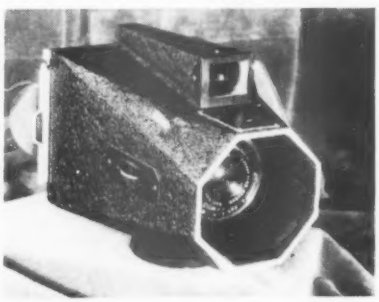
New features include the Carl Zeiss Tessar F/4.5—15 cm. lens, and the Compur shutter with automatically timed speeds, ranging from one second to one two-hundredth of a second, and including bulb and time exposures.

The Model D is designed with the interchangeable back, which permits the use of filmpack, roll film, cut film, or plates as the user desires. The picture size is the standard 3¼x4¼. Cameras are equipped with the filmpack adapter as filmpack is the most easily used and most frequently preferred.

The direct vision brilliant view finder is particularly dependable. The cross hairs etched on the finder element facilitate proper centering and aligning of both vertical and horizontal lines. A marker on the side of the finder element indicates the correction for parallax for use in close-up work.

The length, with the pack adapter, is nine inches. The weight is five pounds, nine ounces. The camera is finished in black crystaline. Cost will be under $300 with filmpack adapter and carrying case.

The Model D is designed and built in accordance with the requirements of latest developments in modern engineering; fitted with the best throughout. It anticipates a new need in camera equipment; supplies a demand as yet only beginning to be felt.



This outstanding, inexpensive aerial camera is operated in one fast, sure motion.

The New KNIGHT TWISTER

Here it is, fellows! It's your old Knight Twister of three years ago but it's all dressed up now, performance and all. Designer Vernon W. Payne again has done a real job.

Light, though extremely rugged, this new Knight Twister is for a Pan American pilot down in South America.

SEVERAL years ago, Vernon W. Payne designed and built a diminutive light biplane that was first described in the columes of POPULAR AVIATION. So popular was this design and type of plane that we are still receiving inquiries from our readers on the subect.

POPULAR AVIATION has an unusual interest in this little biplane for the reason that many of the elements of its design were discussed with the staff of P. A. before Mr. Payne started on his noteworthy project and we have therefore watched its progress with a great deal of interest. This proves the affection lightplane fans still hold for a biplane construction that really looks like a small scale pursuit plane and we believe that such planes will always be popular.

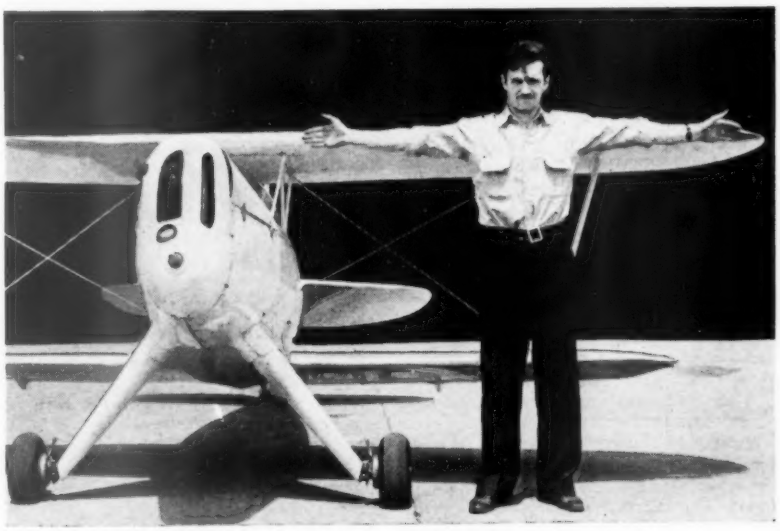
But now, we have the pleasure of announcing a new Knight Twister, designed and built as before by Mr. Payne. This is the Model KTD-2, custom built for a sportsman pilot in Buenos Aires, Argentina, who plans to fly the little ship for sport in Argentina, Chile and Peru. It was given its flight tests recently at Curtiss-Reynolds Airport, Glenview, Ill., and showed a very fine performance.

The top speed is 160 m.p.h. with a cruising speed of 130 m.p.h., with a special Douglas 70 h.p. air-cooled Ford engine conversion. It lands at 45 m.p.h. and climbs 1,100 feet per minute at sea-level. The absolute ceiling is 19,000, an important factor in planes designed for the South American countries—noted for their high mountain passes. The range is 550 miles at cruising speed with the present gasoline tank capacity of 18 gallons.

The wings are of the semi-cantilever type, completely covered with plywood. Wing spars are solid from tip to tip, with the wing tips solid from the last or outermost ribs, and are tapered to a knife edge. Running lights are built into the wings and the fins in the same way as the lights of a large ship.

The accompanying photographs clearly show the fine lines of the Knight Twister and the excellent job of cowling and streamlining. All parts in the air stream are thoroughly streamlined and the

(*Continued on page 60*)



Though there are only 55 sq. ft. of them, the new Twister's wings are as rugged as a pursuit plane's. That's a 70 h.p. engine.

I stepped OUT INTO SPACE

Here's an actual photograph of what a desk-bound P.A. editor looks like just as he steps out the cabin door.

Not many people would walk out the door of an airplane 2,000 feet in the air. So, when a POPULAR AVIATION editor volunteered to try it, we got a bang-up yarn on "how it feels." . . .

by
MAX KARANT

IF it hadn't been for an ingenious device that many people today look at with terror, Lindbergh never would have flown the Atlantic back in May, 1927. And if Lindbergh hadn't flown the Atlantic, American aviation undoubtedly would be at least five years behind time today. Perhaps even ten years.

Lindy would not only have not made that flight, he would have been dead. Dead, in fact, *four times over*. But he is alive and healthy today. So are more than 500 other men who owe their lives to an overgrown silken umbrella known as the parachute.

All these men who are living on borrowed time are Caterpillars. Members of that world's most exclusive organization that demands the respect of even the most skeptical: the Caterpillar Club. Every single member must have saved his life with a parachute before he can wear that little gold caterpillar in his lapel. Some members have more than one of those lapel pins. Lindbergh has the most—four. . . .

You'd think that, with the parachute so conclusively proved a God-send to mankind, the average person would have some respect for it. And inasmuch as a parachute has never failed to open of its own accord, you'd think the average person would look upon the device as a boon. But very few people will.

After many years of listening to many a cock-and-bull story about parachutes I've come to the conclusion that he who condemns the thing most heartily knows the least about it. I know a few pilots today who refuse to wear one. Regardless of the danger involved in some particular flight.

Very little has been written in defense of the parachute. Likewise, very little has been written describing the *actual* sensations and thoughts during a (and in my case, my first) 'chute jump.

For defense, well, I have only to point to the *millions* of safe jumps that have been made that you never hear of. And to the Caterpillar Club. And the Rip Cord Club of the World. (To join the latter you must make a 'chute jump and bring the rip cord down with you.)

The actual sensations and thoughts, however, presented a different problem. I had no files to dig into for that material and, if POPULAR AVIATION readers ever were to get any idea of what runs through a fellow's mind up there as he tumbles through space, well, I either had to find someone who could write his feelings for us—or do it myself. . . .

On July 18, a little after 5 p. m., I stepped out the cabin door of a new Stinson 2,000 feet above Curtiss-Reynolds airport at Glenview, Illinois. . . .

The jump itself took a mere two minutes from the time I reached for the rip cord until my feet touched the ground. But Lieut. E. Verne Stewart and John Wickum, veteran Chicago parachute men, had been slyly making me parachute-minded over a five-year period. During the course of my wanderings around various airports and air meets, I had seen Verne and Johnny handle their Triangle 'chutes hundreds of times. Each time built up more and more confidence in the mysterious umbrellas until, just after the recent Inter-

— and liked it

That proud smile is because of the rip cord that he is holding. He brought it back to earth with him.

national Aerobatic exhibition at St. Louis where I'd seen them give their 'chutes their umpteenth workout, I got a letter. Coming from Verne, it was abrupt and quite to the point:

"I think you are ready to jump. I am confident that you now look upon parachutes sensibly. Which Sunday will be the most convenient for you?"

Just like that.

By the time "the" Sunday rolled around I had been told I was crazy by every expert within 100 miles. Experts, incidentally, who never had been any closer to a parachute than the airport fence.

Those five years of gradual familiarization with Verne's and Johnny's parachutes really filled the bill. Scared? Honestly, no. Yes, I was *worried*. But not over the sort of thing the usual wisecrackers had a field day with: "we'll scoop you up," "I've got a sponge and bucket ready," etc. What bothered me was the practical worry that I might pull that rip cord too soon and wrap the 'chute around the plane's tail. Other than that, however, I had no fears.

Walking back from that airplane ride was one of the greatest experiences I have ever had. The wind had died down to six miles an hour and, as the zero hour approached, a mechanic got the Stinson ready by removing the cabin door. Then Verne and Johnny helped me into the harness that held the two 'chutes. (Bureau of Air Commerce regulations require that all premeditated jumps be made with two parachutes. On routine flights, however, the standard single 'chute can be worn.)

Wearing that harness just before my jump was the most unpleasant part of the whole experience. Two parachutes are heavy, and with the harness pulled up until it was almost impossible to walk, well, I was actually looking forward to getting out of the ship and getting that 'chute open to relieve the weight.

Within ten minutes I had practiced dragging that load out the open cabin door (on the ground), we had climbed aboard and were climbing rapidly toward my 2,000-foot ethereal diving board. As I was to be the first one out (Verne jumped right after me) I was sitting almost in the open doorway watching the earth drop farther and farther below our ship. I deliberately kept watching the earth below to see whether I would become as frightened as people believed I would. But not once, throughout the entire jump, did I feel any of that fear I'd been warned about. My warners, you see, had never had any actual experience with parachutes, a fact I should have paid far more attention to.

Friends on the ground told me later that they were breathless as our ship slowly edged up to the point in the sky I bailed out at. Up there in the ship, however, things were entirely different. At a nod from Verne, who had been watching the ship's position in relation to where I was supposed to land on the airport, I dragged those two 'chutes through the cabin door and stood with my right foot on the step outside, my left hand on the Stinson's wing strut and my right hand inside the cabin door to hold me in position.

The author is enjoying his ride to the ground in the picture below. Note pilot 'chute on the canopy. At the top of the above picture the Triangle's "tail" can be seen. The writer "steered" with this.

Actually, I was hanging out the cabin door at about a 60 degree angle. The cool slipstream from the propeller was pounding on my body and I had to hang on tight to keep from being blown off the ship before I got Verne's slap on the back as my signal to go. But even while standing 2,000 feet in the air, with just that thin metal step between my feet and the ground, I did not experience any actual fear. Perhaps it was because I had flown so much before and was familiar with practically every feeling of flying except the actual jump itself.

Though I leaned out the door only a few seconds, I noticed many things on the ground. Two airplanes were coming in for a landing right under me. I wondered whether they knew we were right above them and would look out for us. I saw a great many upturned white faces. I was somewhat surprised when I looked back at the tail and noticed that it rides high above the cabin level in full flight. Not so much to worry about at that. Then suddenly. . . .

Thump! I felt Verne's slap on my back. I flashed another look downward, then just let go with both hands at the same time. Immediately I left the ship face downward. My right foot hadn't left that step when the rest of my body left the ship with the result that, instead of falling head over heels as I'd originally intended, I fell off on my side in something like a continual barrel-roll. One of the first things I noticed was the streaking blur of airports, skies and airplanes that whirled past me as I seemed to lie perfectly still in mid-air.

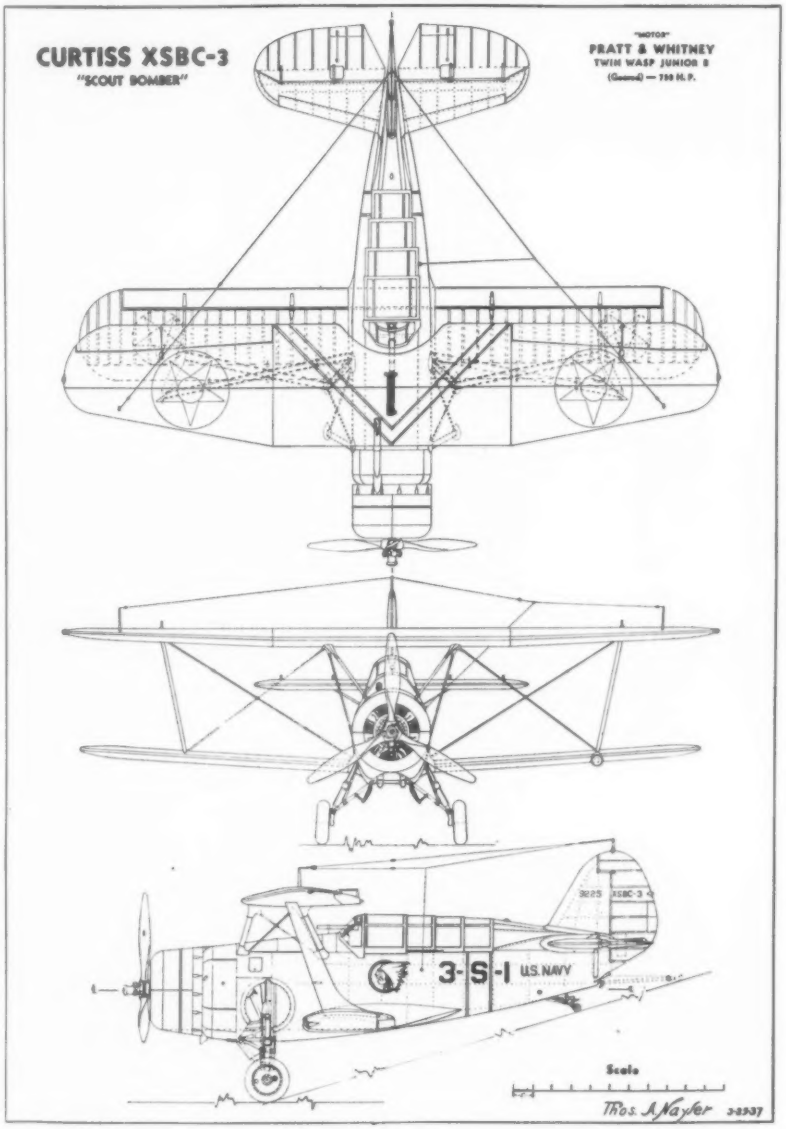
There was not the slightest sensation of falling. Quite subconsciously, I recalled the series of airplanes that flashed my face. Actually, it was the ship I'd just left that I saw several times as I rolled down the sky. Also quite subconsciously, I knew I was clear of the ship and yanked the rip cord. The big Triangle 'chute didn't open instantly. Actually, the pilot 'chute was dragging the main 28-foot canopy out into the air as I continued to fall. But before the main 'chute took hold I realized I still was falling. Then I remembered I had forgotten to count to three, then pull. Nevertheless I saw my right hand out in front of my face with the rip cord in it and the cord's steel cables flapping in the wind. Even at this point, instead of screaming in terror as several know-alls assured me I'd surely do, I was noticing the neat job that had been done in joining the rip cord cables to the ring itself.

Then suddenly the whole world stopped spinning around my body and I just swished up into a sitting position. The main canopy had filled out. There I sat, about 1,800 feet above that sea of faces, yelling happily over the fact that I'd succeeded in hanging onto that rip cord. It had been impressed on me that keeping the rip cord all the way down on your first jump is some sort of an honor. So the first thing I did was to carefully unbutton the right trouser leg pocket in my coveralls, tuck the rip cord in and rebutton the pocket. Then I noticed how silent it was and that I was sitting in a big chair way above the earth and turning gently as I drifted down. When I thought I heard someone yelling I unbuckled my helmet and looked around. It was Verne, who had jumped right after I had. He was floating off behind me and yelling instructions I couldn't understand. By this time I had found that bailing out is about the greatest feeling one can have and I was thoroughly enjoying the few moments before I had to land. First I pulled the forward risers, then the rear ones (there are four). The riser, incidentally, is that section of the harness to which the shroud lines are fastened in even groups.

I found that the steering qualities claimed for the Triangle parachute were true. The 'chute turned easily as I pulled first one riser then another. Then I heard a yell below me. Down on the airport—I was floating directly over the main section of the field—I saw an open car bouncing in my direction. I recognized a friend of mine in the car's back seat as he tried to stand up and shoot motion pictures of me. He looked funny as he jerked around with that camera pointed at me. Johnny, meanwhile, had leaped out of the car and was running across the field toward the approximate spot I would land on. He was yelling excitedly. Something about turning my

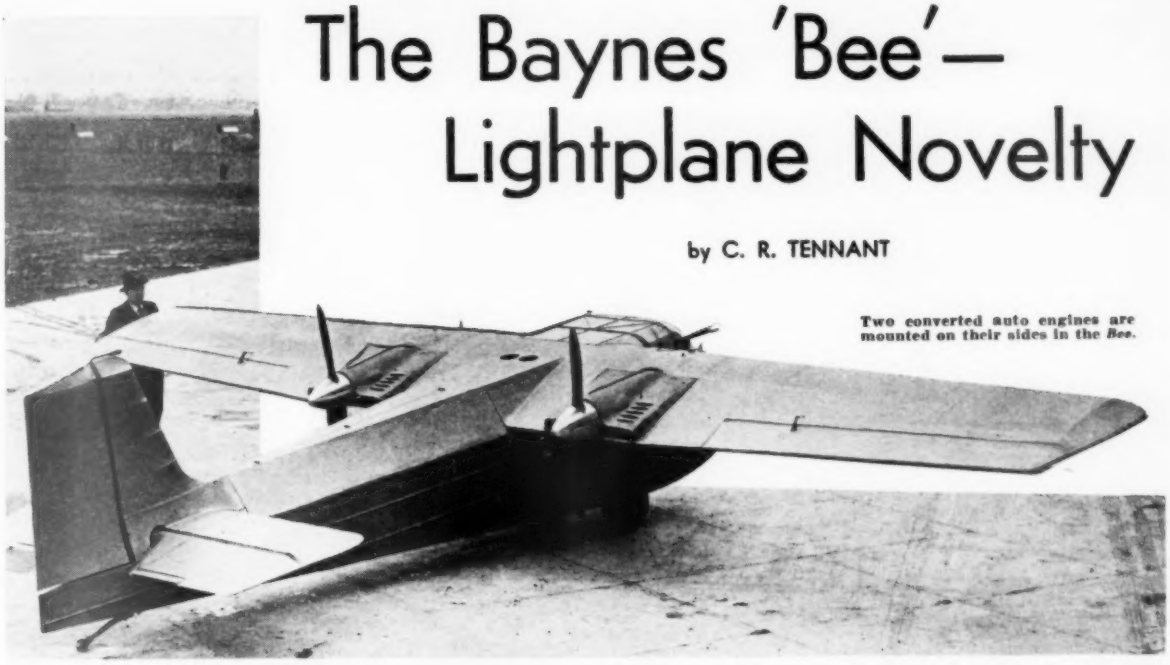
(*Concluded on page* 59)

The Navy's Latest



The Baynes 'Bee'— Lightplane Novelty

by C. R. TENNANT

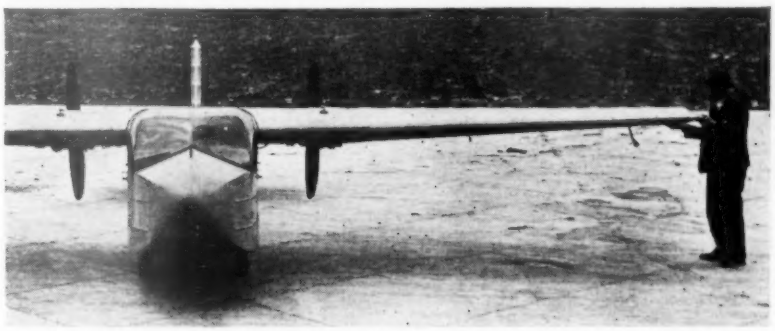


Two converted auto engines are mounted on their sides in the *Bee*.

THERE appeared in Britain recently a new light two-seater with a host of new and interesting features. The Baynes *Bee*, has two engines of 40 h.p. each. What is more, these engines are converted automobile engines of a type used in thousands of British light cars. The conversion has been very complete and all parts that tests have shown to be unable to stand up to the extra strain of aircraft usage have been replaced by others specially designed for the purpose. Some of the components have been replaced for lightening purposes so that the resultant motor weighs no more than 130 lbs. The normal output of 32 h.p. has been increased to 40 h.p. by the use of a supercharger. Despite extensive alterations, these engines are still comparatively cheap to produce, and two of them cost considerably less than one 80 h.p. aero engine.

But the most interesting and original feature of these engines is that they have been so converted that they will run on their sides, and can thus be placed right inside the wing where they cause no drag whatsoever. This marks the achievement of an ideal that engineers have dreamt of ever since the early days of flying. In the last annual report of the N.A.C.A., the necessity of using this arrangement to get maximum efficiency was again emphasized. When an engine has been built to work while on its side, the next, and even greater, difficulty is to successfully mount it in the wing. In the case of the *Bee*, it is attached to the rear of the large single box spar by means of a big steel plate sandwiched between the crankcase and the crankcase cover, the crankcase being integral with the cylinder block. This plate is flanged and is attached to the spar flanges. It is supplemented by a front support in the form of a triangle, with its base at the spar and its apex attached to the cylinder head. A short extension shaft is necessary to drive the two pusher propellers behind the trailing edge. Pusher props have definite proven aerodynamic advantages, and it is only structural dif-

(*Concluded on page* 58)



This inexpensive British lightplane has many novel features in addition to its rugged construction. Notice the unusual engine and landing gear arrangements.

Photographs from "The Aeroplane"

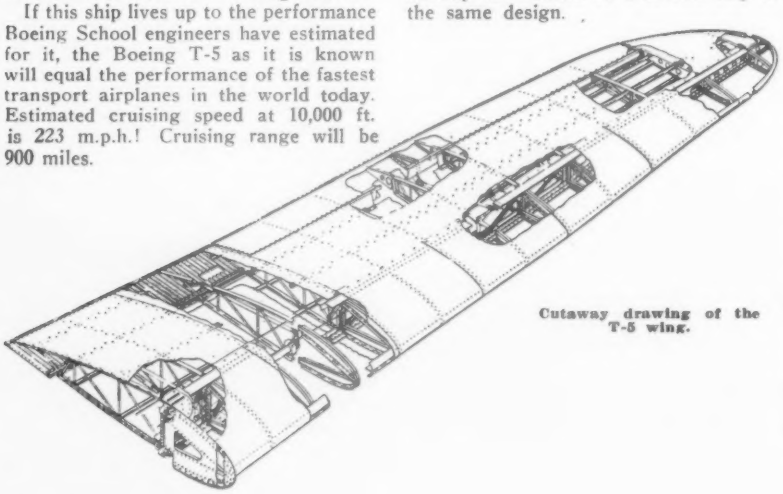
New Boeing Trainer Nears Completion

Boeing school students proudly watch as the finishing touches are put on their original airplane design. For a complete "student" job from design to test flight, it's outstanding.

DESCRIBED in detail in last month's POPULAR AVIATION, the new high-speed long-range trainer designed and built by students of the Boeing School of Aeronautics will soon be test-flown for the first time, officials of the school told POPULAR AVIATION recently. The above photograph was taken when the ship was rolled out of its hangar for the first time to receive finishing touches.

If this ship lives up to the performance Boeing School engineers have estimated for it, the Boeing T-5 as it is known will equal the performance of the fastest transport airplanes in the world today. Estimated cruising speed at 10,000 ft. is 223 m.p.h.! Cruising range will be 900 miles.

The Boeing T-5 was designed by John W. Thorpe, himself a graduate of the Boeing school and now an instructor in the school's engineering department. An all-metal low-wing monoplane of conventional design, the T-5 is powered by a 350 h.p. Wright Whirlwind engine. And, even before this first model of the ship has been tested, work already has started on a second ship of the same design.



Cutaway drawing of the T-5 wing.

A New Technical School

ONE of the sharpest growing pains of the lusty young aircraft industry is the acute shortage of skilled craftsmen.

The number of suitably trained men becoming available is lagging remotely behind the sky-rocketing volume of orders for planes. With American aircraft factories in the ruck on production to the tune of over $135,000,000 worth of planes the problem is staggering, but several important industry figures have at least attacked it.

The point of attack is the establishment in Los Angeles of an elaborate training institution designed and operated to train men in actual factory technique rapidly enough to permit their earliest possible entry into the industry. The institution, virtually a vocational training school, is supervised by an executive board of three prominent airplane factory officials. This group and eight other heads of leading aircraft plants and airlines make up an advisory council.

The management and operation of this new training school, which has been given the name of the Aero Industries Technical Institute, Inc., are supervised by Robert E. Gross, president of the Lockheed Aircraft Corp.; John K. Northrop, president of the Northrop Corp.; and C. A. Van Dusen, vice president and works manager of the Consolidated Aircraft Corp.

The Aero I. T. I. has been designed in both physical equipment and instructional methods to produce technicians who in knowledge and ability will meet the practical requirements of aircraft builders. All of the equipment used for training purposes is the same as that used in actual aircraft production and the latest production methods are followed in the school's shops.

The various courses embody voluminous technical data on aircraft design and manufacture that has never been used for instructional purposes, having been kept closely guarded by the industry. Instruction and practice are provided in all phases of airplane construction, assembly, testing, and maintenance.

The Advisory Council of the Aero I. T. A. is made up of previously named executive board members and an imposing list of aircraft industry leaders. The additional members are D. L. Brown, president, United Aircraft Corp.; Donald W. Douglas, president and chairman of the board, Douglas Aircraft Corp.; Major Reuben H. Fleet, president, Consolidated Aircraft Corp.; Jack Frye, president, Transcontinental and Western Air, Inc.; J. E. Schaefer, president Stearman Aircraft Co.; I. I. Sikorsky, president, Sikorsky Aircraft division, United Aircraft Corp.; E. E. Wilson, president, Chance Vought Aircraft division, United Aircraft Corp.; and J. L. Kindelberger, president, North American Aviation, Inc.

A NEW YANKEE TERROR

Northrop's A-17A

Sporting the GHQ Air Force insignia, this A-17A is based at Langley Field.

Even deadlier than its predecessor, the A-17, this latest Northrop terror is 15 m.p.h. faster than the original ship. Unlike the A-17, the A-17A has retractable landing gear which, according to War Department air officials, will make for safer forced landings which the A-17's fixed landing gear might turn into a crash fatal to its crew. The A-17A's folding undercarriage makes "belly landings" comparatively simple. Through the mission of the attack plane calls for average operating heights of from 50 to 100 feet above the ground, the A-17A's engine has been supercharged up to 2,500 feet. Little known outside the Army Air Corps is the fact that 100 of these newer ships have been ordered, 70 of which had been delivered as of August 1. According to John K. Northrop, head of the company bearing his name, the remaining 15 ships should be delivered by the end of October. Each ship is so heavily armed with machine guns and bombs that one squadron could disable a marching regiment single-handed. Rarely flying above the tree-tops, attack planes have specially muffled engines for stealthy approaches, are camouflaged on the top side only. Many War Department officials look upon the lightning-fast hedge-hopping attack plane as the backbone of American military aviation in the next war. The A-17A shown here bears no war paint, is just used by GHQ Air Force officials for special missions.

Rugged and easy to operate, the striking cleanliness and simplicity of the A-17A's landing gear is outstanding. Another Northrop-designed advancement is the perforated flap that can also be seen along the wing's rear edge.

Taxi Drivers of the SKY

by Selby Calkins

This is Bob Blair, transport pilot No. 716. Many an urgent flight—or elopement—has sailed into the skies with Blair behind the controls of his trim new Stinson. Blair is the man who taught Ruth Chatterton to fly.

YOU think firemen and doctors turn out in a hurry at all hours of the day and night? You think Coast Guardsmen are called upon to go places, and go fast, upon the shortest notice?

Their's is a monotonous existence compared with that of those engaged in the modern oddest of odd jobs—operating an aerial charter service.

Throughout the United States there's a new business on wings. It is the business of flying special charter trips—anywhere, any time—and it has become one of the outstanding developments of modern aviation. Dick Merrill and Jack Lambie have just returned from one such trip—a flight from New York to London and return to bring back first pictures of the Coronation.

Here was a flight that a decade ago would have made aviation history, as Lindbergh did when he flew the same route except that he went on to Le Bourget. In 1937 it was practically a routine flight for the workaday purpose of bringing the American newspaper-reading public pictures of the greatest historical pageant of the age by the speediest known method of transportation.

Logically enough, as Southern California has developed into the nation's outstanding aviation center in so many other respects, it has also developed the speediest and most efficient general charter service.

Go to any major airport near Los Angeles, for instance, and announce that you wish to fly to Alaska, Panama, Mexico City, New York, or practically anywhere else and some young man will casually guide you to a plane, climb in with you and you'll be on your way.

It has become as simple as that.

There is, in the Los Angeles area, a group of charter operators who pride themselves on providing what they believe is the fastest, safest aerial taxi service in the world.

Here's the roster:

At Union Air Terminal, Burbank: Lewis Air Service, operated by Joe Lewis, a pioneer pre-war and former airline pilot with two decades of flying behind him, now operating seven airplanes in a charter, aerial ambulance and student instruction business.

United Air Services, Ltd., operated by Paul Mantz, another pioneer pilot, famous motion picture flyer and technical adviser to Amelia Earhart in her history-making exploits.

At Grand Central Air Terminal, Glendale: Grand Central Fying Service, operated by Joe Plosser with a combined charter service and one of the outstanding aviation instruction schools in the United States.

At Los Angeles Municipal Airport: Bob Blair, for many years an outstanding exponent of the "ready any time to go anywhere" policy but in recent weeks gradually withdrawing to fill a position with the Stinson sales organization. At Clover Field, Santa Monica: Howard H. Batt, who has been flying since the early days of aviation development and who finds time to head the Association of Motion Picture Pilots as well as a speedy charter service and the distributorship of two makes of sports planes.

None of these men is the romantic conception of the daring pilot, steely-eyed and with a grand fearless disregard for his life. They are almost humorously opposite to this conception. Each one is a business man first, a conservative flyer who places safety of his passengers and equipment above all else, a pilot who spends much time and money keeping abreast with the latest developments in the aviation industry and in maintaining his own and his employes' skill and efficiency at the highest possible level.

Their future is bound up with the progress of aviation toward higher and still higher standards of safety. They keep themselves and the pilots they employ keyed up to expertness in their

Probably the most famed of California's aerial cab drivers is Paul Mantz. He achieved a good bit of fame when Amelia Earhart selected him as her technical adviser. But his every-day business is charter flying.

If, when you are in California, you suddenly have to get to Walla Walla or Steamboat Springs in a hurry, give Joe Plosser a buzz. Just give him time to get his maps and ship ready. That's the charter pilot's life.

We had often wondered just what the life of a charter pilot consisted of. Then Mr. Calkins, a Hollywood aviation writer, wrote in to tell us about it. You'll agree that it's a good story.

craft. They equal airline standards and in many instances excel those standards in flight ability, navigation and radio training. Their planes are all equipped with two-way radio.

"It is just good business practice—we're selling transportation," they agree matter-of-factly.

Who charters airplanes? Let the sky-taxi chauffeurs tell you.

"People in a hurry, and to whom hours mean money," says Howard Batt. "I flew Sen. William G. McAdoo to New York one day, then to Washington and back to Los Angeles the next. The charter cost him more than $800 but he made his own schedule and the speed was worth the money to him.

"Mary McCormic, the opera star; Tom Storke, Santa Barbara newspaper publisher; Ted Healy, film comedian; and a good many Los Angeles business men are regular charterers. They have found it profitable again and again to charter a plane instead of worrying about transportation schedules."

Bob Blair's answer was much the same. In addition he listed motion picture stars, sportsmen and financiers among those who valued quick trips to out-of-the-way places more than the cost involved.

"Flights to Ensenada, Palm Springs, Death Valley and other resorts have long since become routine requests during the seasons those playgrounds of the wealthy are open," Blair explained.

"The saving in time more than compensates for the slightly additional expense and the time saved is often even more important when a quick journey is planned to some city off the regular air lanes," he added.

The Lewis Air Service—Joe Lewis and two youthful but highly trained transport pilots in his employ—chalks up thousands of miles of cross-country flying each year in the active charter business Lewis directs.

A stroll along the apron at the Union Air Terminal at any hour of the day or night is liable to bring you alongside a Lewis plane warming up for a flight to far places.

A goodly portion of his traffic is of a type that has brought the short, stocky Lewis more than a little good-natured ribbing from his fellow airmen. They call him "Cupid" and "Love's Little Messenger" and "Honeymoon Joe" and accuse him jokingly of getting "rates" from scores of Nevada and Arizona ministers and marrying justices.

You've guessed it—elopers have found Lewis and his pilots always ready for those aerial jaunts to nearby Gretna Greens. Mary Astor and Manuel del Campo; James Ellison and Gertrude Durkin; Harry Joe Brown and Sally Eilers; Phillip Karlstein and Dixie Martin; Manly Danforth and Evelyn Hand, and Howard Lang and Vicki Astlett are a few of the prominent motion picture couples that flew to Yuma with Joe Lewis at the airplane controls.

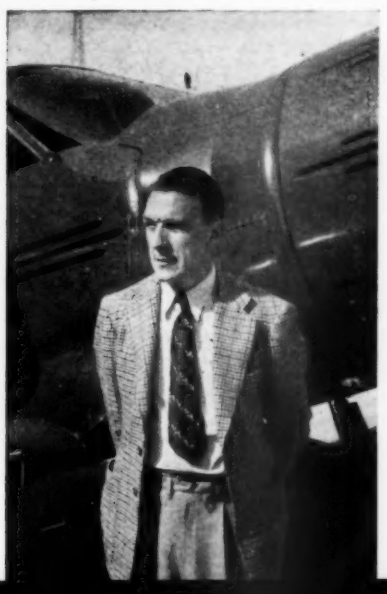
Because of these recent trips and scores of others, Los Angeles newspapers have long since learned to keep a weather eye on the Lewis office whenever there is an elopement in the offing.

Other jaunts, though equally profitable, arouse much less interest in the public eye. They are the aerial ambulance trips Lewis is often called upon to make with his specially designed ambulance plane.

It is equipped with a "flying hospital room" separated from the pilot's compartment. In the ambulance portion of the plane is a regulation hospital

All the punching this Joe Lewis ever does is on the throttles of his three ships. For his long-haul work Lewis uses a new Stinson. For sport and student work he has a Kinner Sportster. A Stearman does odd jobs.

Howard Batt will roll out either his new Beechcraft or his Waco on instant notice.



stretcher-bed, oxygen equipment, medicine cabinet and seats for a doctor and nurse in addition to the patient.

"Rochester, Minnesota — operation — one chance in a thousand—" comes a terse telephone call and the ambulance ship is soon winging its way eastward in a race with death.

"Just missed the San Francisco plane —have an appointment there at noon," gasps a man, brief case in hand, as he runs up to the line of Lewis airplanes. A pilot guides him into a plane, the starter spins and the business man keeps his appointment.

"My wife is on *The Chief* bound for Chicago with all our luggage but I missed the train—where can we catch it?" another harassed traveler demands as he climbs out of a taxi at the airport.

"San Bernardino, Barstow or Needles —we'll catch it," says Lewis and the worried man is on his way.

Three young people approach Lewis, two men and a girl. One of them steps forward.

"My name is ——— ———," he says, drawing a little leather case from his pocket. "Transport Pilot No. ——. My sister and her fiance want to get married and I'd like to rent a plane to take them to Yuma."

A brief discussion of the young man's experience follows, Lewis flys once around the field with him to satisfy himself that his customer is a competent pilot, and the trio is off to Yuma. They'll telegraph Lewis when they arrive and again when they take off again for the return trip, so he'll know when to expect them.

A man, his wife and their young son approach. They've never been up and they'd like to take a ride over Hollywood and Los Angeles. Lewis summons a pilot, they all climb into a plane and three more converts to the safety of flying are made, for their plane and pilot operate just as carefully for that short sightseeing trip as if it were off for New York.

Paul Mantz is another who sleeps with a packed bag and full map case beside his bed. He heads the United Air Services, Ltd., and does much of the charter flying himself in addition to stunting for motion pictures, flying newsreel camera planes and working with Miss Earhart.

Two years ago it fell to Paul Mantz to demonstrate that no charter is likely to be refused by Southern California operators. He had just flown a party to San Francisco. When he checked in by telephone from the airport there, his office at Burbank read him a radiogram from a ship in mid-Caribbean.

"DOCKING BALBOA WEDNESDAY NIGHT. ESSENTIAL FLY LOS ANGELES. MEET BOAT BALBOA," it said.

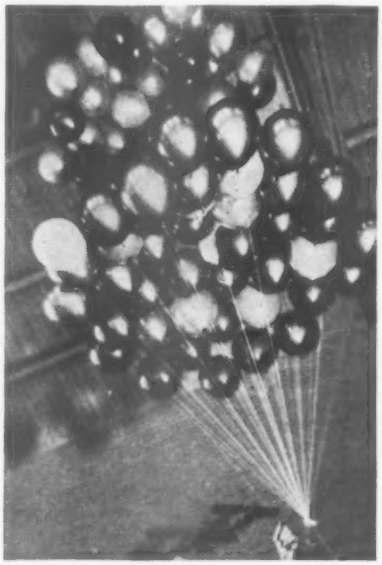
"Radio him that I'll meet the boat," Mantz instructed his secretary.

At two o'clock Monday afternoon he was back in Burbank, where his maps, long-distance traveling bag and another plane were all ready for him. He went to Los Angeles to get clearance papers for the countries south to Panama.

"By 3:30 I had everything set at the

(*Continued on page* 56)

Piccard's Balloon Illustrated
by J. Crozier



A cluster of Piccard's balloons.

IN this model of the stratospheric balloon used by Dr. Jean Piccard, on his last attempt on the stratosphere, we find that the gas is confined in a number of small balloons rather than in a single envelope.

When a single envelope is employed, the weight of the materials increases very rapidly after a certain diameter is exceeded, for the pressure on the fabric increases with the "square" of the diameter. This effect is very prominent in balloons as large as those employed for stratospheric flights, and to reduce this weight factor, and also to assist in the control, Dr. Piccard subdivided the gas among a number of balloons as shown.

In this model, there are two clusters of 40 balloons per cluster, any one or all of the balloons being detached from the cluster by a hunting knife when so desired. As a matter of fact, Piccard found that a simple matter of disposing of a balloon and its lift was to shoot it out with a revolver and this he did.

I.O.O.B.A.D.A.P. (!)

IF you were faced with having to become a member of the Ignoble Order of Blind and Dumb Airplane Pilots, well, you wouldn't laugh so loudly.

It seems that student flying at Pensacola (U. S. Navy) has come to such a pass that the boys formed this mushroom society that is as iron-clad as a good swift kick in the empennage.

Any student is eligible. "Applications" for membership are considered "received and approved" when a student pilot has committed a flying boner.

New members are forced to wear a "suitably inscribed" metal breastplate when not flying. There are no dues.

Some Dope on Aero Clubs

YES, sir, these flying clubs are really practical. At last it is possible for anyone to fly, now that the club plan of owning an airplane has been proven to be successful.

For a long time it was impossible for a person of moderate means to try to own and keep up a decent modern airplane. To be sure, old obsolete planes could be had for a small sum of money, and they would fly—sometimes. But now it is possible for a person of limited means to have the latest model of airplanes at his disposal for the very small sum of ten dollars a month for one year. That sounds unbelievable, doesn't it? But here are the facts in black and white.

Today, a very neat, efficient airplane can be purchased for less than $1500. Even by paying one-third down and the rest in 12 payments, one man may find it too expensive for him to handle. But when he is paying only one-tenth of the entire cost and doing it on the installment plan, then it becomes possible.

About a year ago several young people decided to form a club and purchase an airplane. After a good deal of work ten persons were persuaded to shake the lowly dust from their feet and become one of nature's most exalted humans, a pilot! To the average person, anyone connected with aviation is a romantic figure and a superior being. I hate to dispel this belief, but there was nothing romantic or superior about this group.

They were just an ordinary bunch of Americans with an average paycheck of $22.50 a week. There were two jewelers, the owner of a hamburger stand, a stenographer, a cigar salesman, two farmers, a bank clerk, an auto parts salesman, and a helper around the airport.

Their first act was to form a club and draw up a constitution and by-laws. Then came the matter of selecting an airplane. After some shopping around a small cabin plane was decided upon. The members made a small down payment of $57 which included the expense of delivering the plane to the local airport.

About two weeks after the order was placed, a telegram was received from the aircraft company saying the plane was ready. Soon the ship was on the field and the flying started. Payments were $9.80 a month each for a year.

When the member wished to fly, he paid the club treasurer at the rate of $1.50 per hour for his time and the treasurer would pay all bills at the end of the month. This, of course, did not cover the cost of instruction. The manager of the airport, a transport pilot, gave instruction for $2 an hour, and had final say as to when the ship could be flown.

For instance, if some member wanted to fly when it was a little gusty and

(*Concluded on page* 66)

FOR OTHER LANDS

The Vought V-143 Fighter

Lesser nations not equipped to produce modern military aircraft now have access to this fast American fighter.

FOR reasons best known to the Army Air Corps, the Vought V-143 will never be a U. S. fighting plane. Though originally designed and built first for the U. S. Navy (by Northrop), then for the Army (by Vought), this ship has finally ended up on Washington's "released for export" list.

Basic design of the original V-143 was turned out several years ago by Northrop Aircraft. The ship built then was intended to be a high-performance Navy shipboard fighter. Somehow the Northrop fighter never got beyond that experimental ship. The design was shelved for some time, then turned over to Vought Aircraft for further development. About two years ago it reappeared as the Vought V-143. Since then, this design has again been altered somewhat and the ship on this page has had its fuselage lengthened somewhat to increase its longitudinal stability. Also, the tail assembly has been redesigned.

Though no actual performance figures have been released concerning the latest redesigned V-143, those figures applying to the older version shown on this page are representative. Tests, many of them conducted by the Army Air Corps at Wright Field, gave the V-143 a maximum speed of 250 m.p.h. at 8,000 ft. with a cruising speed of 220 m.p.h. at 75 per cent power at the same altitude. Fully loaded, the landing speed of this ship is 60 m.p.h. while its rate of climb at 8,000 ft. is 2,100 f.p.m. Using this same altitude for further tests, the ship's range, using 75 per cent power, was found to be 770 miles. However, by using only 50 per cent power the range is increased to 1,070 miles. Service ceiling is 28,000 feet, absolute ceiling between 30,000 and 31,000 feet. These figures were obtained with the ship using a 750 h.p. 14 cylinder Pratt & Whitney *Twin Wasp Junior* engine.

Though U. S. military forces have no particular need for this ship at present, there is urgent need for a rugged, high-speed airplane of this type elsewhere in the world. Hence, as an export model, the ship should prove a good seller. China, for instance, is in need of a fighting plane like this at present. That nation's air force is made up mostly of a conglomeration of many types of obsolete aircraft. Against modern Japanese equipment Chinese airmen are comparatively impotent. Other of the smaller nations also might well invest in modern equipment like the V-143.

Normal armament on this ship includes two .30 caliber machine guns that fire through the propeller arc. Two .50 caliber guns may be substituted. In addition, the V-143 can carry 300 lbs. of bombs on two external racks mounted under the wings.

The V-143 is metal throughout. The covering, with the exception of the fabric-covered control surfaces, also is metal. A metal controllable-pitch propeller is standard equipment, although increased performance can be obtained through the substitution of a constant-speed propeller.

An outstanding feature of the V-143 is its simple, rugged landing gear. Note wheel wells in the wing.

They Were Awarded Diplomas of Merit

"For services rendered," these attractive American Airlines stewardesses have been awarded diplomas of merit. These girls served valiantly during the recent southern floods.

NINE beautiful and capable nurses, all of them now stewardesses for American Airlines, were awarded diplomas of merit as the "outstanding nurses of the year" for their service in the improvised hospitals in Louisville during the flood last winter. The award is given annually (usually to one nurse) at the Rho Pi Phi, national druggists convention.

At the same time the diploma of merit will be awarded by the druggists to American Airlines, as "the private company which did most for humanity" during the year, this applying to American's outstanding aid to the Louisville and other cities' flood sufferers.

The nine stewardesses volunteered for duty in the flood area and for over a fortnight worked night and day in the hospitals in the stricken city. At the same time one of the stewardesses—Miss Phyllis Alldredge—was worrying about her own family being missing in the flood at Evansville, Indiana, her home town, but later learned they were all saved. Two other Indiana girls—Miss Joan Waltermire of Indianapolis and Miss Agnes Spence of Ft. Wayne—were in the group.

The other six girls and their home towns are: Misses Marie Wanda, Kankakee, Illinois; Catherine Goth, Bethlehem, Pennsylvania; Margaret "Pat" Horton, Pompton Lakes, N. J.; Thelma Fuller, Charitan, Iowa; Mae Leslie, Antler, South Dakota; Mabel Williams, Kalamazoo, Michigan. All of them reside in Chicago.

The selections of the stewardesses was made from a questionnaire sent to the membership of the Rho Pi Phi Fraternity and from replies received from the same query to newspapers. Nearly 2,000 replies were received. The fraternity comprises the graduates of 14 leading schools of pharmacy in the United States with 5,000 members.

Blackburn Sharks Built in Canada

BLACKBURN *Sharks*, famed British reconnaisance airplanes that have been used by the Royal Air Force for some time, will be built in Canada in the near future by Boeing Aircraft of Canada, Ltd., at that company's Vancouver, B. C. plant.

The ships are to be built for the Canadian Department of National Defense and, according to the contract, are to be delivered to the Royal Canadian Air Force within two years. The Boeing company will build the ships under license from the Backburn Aircraft, Ltd., of Brough, E. Yorks, England.

The recently awarded contract (the first batch is to consist of 11 ships) marks the return of the Canadian division of the Boeing company to the aircraft manufacturing field. Last product of Boeing's Canadian factory was the *Thunderbird*, a six-place cabin flying boat which was produced in 1929-30. Between then and now, however, the company had limited itself to reconditioning work for the R.C.A.F., the Aero Club of British Columbia and various commercial operators.

The Blackburn *Shark* is a single-engined (Armstrong-Siddeley *Tiger*, 14 cylinders, 700 h.p.) two-place open biplane. Armament consists of a flexible machine gun in the observer-bomber's rear cockpit, a fixed gun firing forward through the propeller arc and either bombs or one torpedo that can be slung between the pontoons or whatever other landing gear happens to be used. Top speed is 152 m.p.h., landing speed is 62 m.p.h. and the *Shark's* cruising range fully loaded is 550 miles.

A Woman Airline Director
by Helen Waterhouse

"THEY can do everything from changing the baby to working out a crossword puzzle for you. They are well-trained as bell hops and you don't have to tip them."

Thus, Miss Marie Sullivan, first director of an airline woman's department in the country, described the latest addition to Eastern Air Lines—the flight stewards who take the place of stewardesses. She was talking before the women's chapter of the National Aeronautical Association here—the largest organization of that kind in America.

The sparkling brunette, who was formerly a hotel manager, went so far as to predict that the day of women stewardesses is waning—due to the fact that the work is becoming too heavy for them.

"We have found that it is almost an impossibility for a little 115 pound girl to get meals and lift heavy trays for 18 passengers in the short space of time it now takes to get from one city to another," said Miss Sullivan.

"She isn't physically able to continuously be moving portable typewriters and rolls of blue prints and heavy blankets in the constant rush in which she has to work.

"Why on a recent trip back on a sleeper line, I noticed that the stewardess was entirely fagged at the end of her trip after making up berths, etc. Her hat was on the back of her head, and she was generally all in."

Miss Sullivan also added that it really doesn't take a trained nurse to change a baby.

"I've seen our stewards do it very deftly," she said. "I have seen them put tiny babies to sleep whom the mothers were unable to handle."

Miss Sullivan also hinted delicately that more women might travel by plane, were they attended by young good-looking stewards, from 25 to 35 years old, and weighing from 125 to 150 pounds.

(*Concluded on page* 65)

Meet Miss Marie Sullivan, popular young women's department director for Eastern Air.

A Day At a Civilian School

This is the story of a day of work and fun with an average group of Parks Air College students. It's not so easy, though.

by EVANS E. JOHNSON

Before the flying student even leaves the ground, he gets a thorough talking-to by a veteran Parks instructor. Here is a student and teacher in the Parks school's Kinner.

THOSE of you who believe that the routine in a civilian flying school is more lax and less rigorous than that of a government flying school should only visit Parks Air College, East St. Louis, Ill., to discover that they follow essentially the same lines of work as the government schools and with the same fidelity to detail.

To follow the students through a whole day's work at the Parks Air College requires that we report for duty promptly at 8 a. m., for at this time all of the students assemble in the various departments ready for the day's work. The students find this early rising quite a simple matter, for they are housed in four large dormitories located at the school and close to the various departments.

Parks students have access to every type of equipment. This is a J-5 Travel Air.

This student is about to take off on a aerobatic flight. Parachutes must be worn then.

Students taking the Professional Flight and Executive courses, begin the day in the classroom where they listen to lectures on the general subject of commercial air transportation. Later in the day, they assemble in the radio department, where they receive training in radio reception.

They are then transferred to the meteorological department where they make weather observations, transmit weather reports on the teletype, draw weather maps, make forecasts and engage in other activities related to the study of weather—one of the most important elements in modern commercial aviation.

At the same time, students in the Master Mechanics School are also started off in the classroom, listening to lectures on the principles and theory of the mechanical elements of aviation. They not only receive instruction of a theoretical nature, but later follow the theory out in practice on servicing a Wasp-powered Bellanca and similar projects that are exactly the same as those that will be encountered in their jobs.

Every conceivable shop operation known to aviation is at the student's disposal, ranging from simple welding jobs up to engine overhauls. The finest

and most modern of shop equipment affords ample opportunity for gaining practical "monkey wrench" experience that will later prove to be of such assistance in his later working days on the actual job.

Beginning at 10 a. m., the students are given a brief recess and an opportunity of getting out under the trees for a breath of fresh air. And, after this well earned relaxation, they are back at it with a vim with the work continued until the noon hour.

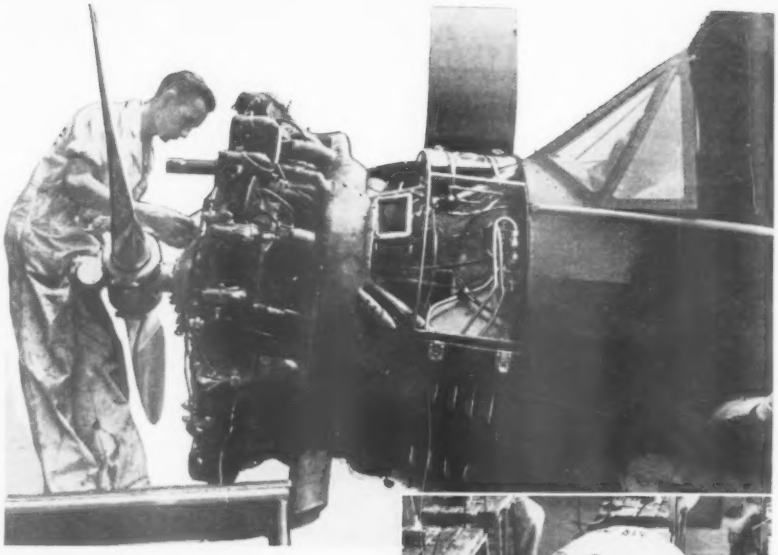
The engineers, in the meantime, have been pushing slide-rules, making layout drawings and going through all of the complex operations incidental to the study of aeronautical engineering. And this is not simply a "paper job" for these embryo engineers have at their elbows inspiring examples of the latest in airplane and engine design. It is so much easier to study and understand engineering principles when we have standard accepted examples of the problem before us.

This is a distinct departure from the practice in the old days when an engineering student seldom saw a plane of the type that he was designing, even at a distance, and he depended entirely upon the ability of his instructor to visualize the ship or engine. It is far better to have an aeronautical engineering school so located within the confines of an aviation flying school so that he can be conversant with both shop operations and practical flying.

And then comes good old noon time for a good rest and an excellent lunch in the school cafeteria. This cafeteria feeds five men per minute and husky appetites are well provided for in both quantity and quality of food.

At almost any time, from early morning until after dark, you can find someone "on the line," ready to keep his appointment with the flight instructor or else using this vantage point for watching activities on the flying field. Parks has always been noted for the excellence of its flying courses and here we find the students enthusiastically devoting themselves to the practice and principles of flight.

You will see a primary student, for example, climbing into a side-by-side Kinner Sportster for his early morning lesson in which the elementary points in flying are pointed out to him in the convenient side-by-side ship.

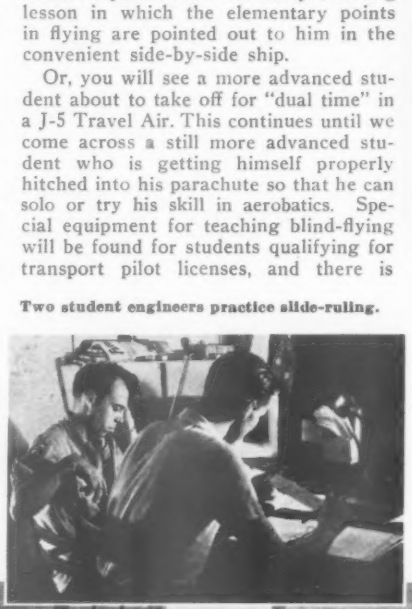


How a future master-mechanic gets his maintenance training. Actual work is best.

Or, you will see a more advanced student about to take off for "dual time" in a J-5 Travel Air. This continues until we come across a still more advanced student who is getting himself properly hitched into his parachute so that he can solo or try his skill in aerobatics. Special equipment for teaching blind-flying will be found for students qualifying for transport pilot licenses, and there is plenty of flying at Parks between dawn and twilight.

Experience in torch cutting and welding.

Two student engineers practice slide-ruling.



At 4:30 p. m., when all classes are dismissed, there is a general exodus from the class rooms and shops. The students return to their dormitories where they use the showers and clean up ready for supper at 5 p. m. Then, after supper, comes the recreation hour which will embrace everything from practicing on the rifle team or playing tennis down to pure loafing. This might

(*Concluded on page* 65)

An early morning class.

Where Is Rocketry Today?

By CHARLES G. PHILP

(*Author of "The Conquest of the Stratosphere"*)

Not much has been heard lately about this fascinating astronautical science. The author, prominent in his chosen field, reviews the present status of the rocket.

THE general principles of rocketry have already been outlined in these columns on several occasions in the past and most people, generally speaking, are now aware that the principle of propulsion, exemplified by the rocket, is seriously put forward by a few select scientists of repute, as a means of propelling an aeroplane in the higher regions of the atmosphere where the ordinary aerofoil and tractor screw are unable to function.

But it is now 18 years since Professor Goddard of Clark University, Worcester, Mass., first demonstrated to the world that the rocket principle of propulsion would function just as well, or even more effectively, in a vacuum, and, as yet, the aeronautical world is still awaiting a practical demonstration of the rocket principle worthy of their serious attention from an engineering point of view.

Although numerous demonstrations of rocketry have been staged in the past, such demonstrations cannot, in all fairness, be said to have been of such a nature as to impress the average aeronautical engineer, or to enthuse him into taking an active part in the development of rocketry now in progress, and it is not too much to say that even today, rocketry is not regarded as being of any serious consequence in the aeronautical world.

As one who has closely followed the development of rocketry all over the world I will endeavor to show that this attitude of mind, though seemingly justified, is far from being correct. That it is, in fact, due more to lack of reliable information on the subject than to any inherent failure of the principles of rocketry.

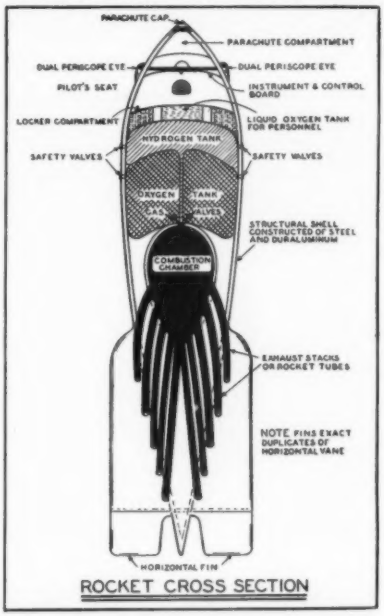
In the first place, it is, of course, quite wrong to suggest that rocketry has been "on the market," so to speak, for 18 years, and that during that period it has failed to produce any practical achievement worthy of the serious attention of the aero engineer.

Rocketry, it is true, dates from 1919, but it was not until 1927 that the first rocket society was formed—the German Rocket Society—and for eight years at least, out of the 18, the practical development of rocketry was confined to a very few scientists, such as Professor Goddard in America, and Professor Oberth in Europe.

Space will not permit the describing in detail of the remarkable progress made in the course of a very few years by German experimenters. It is, however, a matter of definite achievement that Max Valier succeeded in driving a rocket car for seven circuits round the Tempelhof Aerodrome, at an average speed of 90 m.p.h.; that in 1929 he drove a rocket sledge over the ice of Lake Starnberg at the terrific velocity of 235 m.p.h.

On June 11, 1928, he piloted a rocket-driven glider, after a catapault start, for 1,500 yards in 80 seconds; and von Opel on September 30, 1929, piloted the first rocket plane to leave the earth under its own power for 1¼ miles at a speed of 85 m.p.h.

From an engineering point of view these actual tests proved beyond all



ROCKET CROSS SECTION

doubt that the rocket was an engine of unusual power, and von Opel's rocket plane opened up to aviation a new perspective, revolutionary in its implications.

And yet, strange as it may appear at first sight, no further tests with full-sized airplanes have been made since von Opel's sensational performance in 1929!

Instead, we have had occasional demonstrations with, what are little more than "toy" rockets, many of which, to quote a contemporary aero journal, have ended in "lots of smoke and a loud bang —and a slump in rocket shares."

There are, however, good and excellent reasons for this cessation in experimental work with full-sized rocket planes, and for the disappointing exhibitions of the "model" rocket displays which have substituted them. The following detailed analysis of the actual facts of the case should make this abundantly clear.

In the first place, the disastrous results in Germany of several of the earlier powder rocket experiments indicated that powder fuels were very difficult to control and this, coupled with the dissatisfaction of the authorities, caused attention to abruptly shift from powder to liquid fuels. For the latter not only offered a far greater amount of energy per pound weight, but they also could be controlled with much greater safety.

And in the second place, an even more revolutionary change in the method of rocket experimentation was brought about by the introduction, by the German Rocket Society, of the "proving stand." This consisted of a set-up by means of which, rocket motors could be tested as to "lift" and general efficiency, *without going to the expense of building the entire rocket.*

From being relatively crude affairs in the first instance, the latest types of "proving stand" are now designed, not only to supply propellants to rocket motors under substantially the same conditions of quantity and pressure as would obtain in a rocket, but, at the same time, obtain photographic records of the developed thrusts, chamber and propellant pressures, etc., thus permitting of subsequent detailed and careful study and analysis of the general behavior of the motor. And when shots by complete rockets are essential, as a complement to the "proving stand" tests, motion pictures are taken of the flights, and these, too, render valuable information of the behavior of the complete rocket in actual flight.

Because of the facilities of the "proving stand," it is only on very rare occasions that the more responsible rocket experimenters, such as the German Rocket Society, the American Rocket Society, and Professor Goddard, give any public exhibitions of rocket flights, and, on grounds of economy, these are usually of "model" size.

They appreciate, of course, that an occasional demonstration serves a good purpose by arousing public interest in rocketry, but they have realized, long ago, that before the rocket can be successfully harnessed in the service of man, *an immense amount of experimental and theoretical work must first be carried out.*

They believe, and rightly so, that a far better service will be rendered to rocketry by attacking the problem under laboratory conditions, than by immature and premature public demonstrations of rockets in actual flight.

(*Continued on page 70*)

Building the Fairch d Ranger

by

PAUL W. LINDBERG

Model editor and designer
for POPULAR AVIATION

THIS model with its sleek, racy design and proven flyability will be the pride of every model builder upon its completion.

The design of the ship as a whole makes it very simple to construct. The model is equipped with an extremely simple type of shock absorbing landing gear, the design of which is very efficient under all conditions. All controls are adjustable as well as the wing struts so that the wings may be adjusted to dihedral. The false struts which fasten from the pants up to the wing struts as well as the struts that run up to the cabin are used for display purposes only.

Construction of the Fuselage

The main longerons are of basswood; all other pieces are of balsa. When the two slides have been constructed, the cross members are cemented into position. One-half inch No. 18 wire nails are driven through longerons into the upright and cross members of the fuselage.

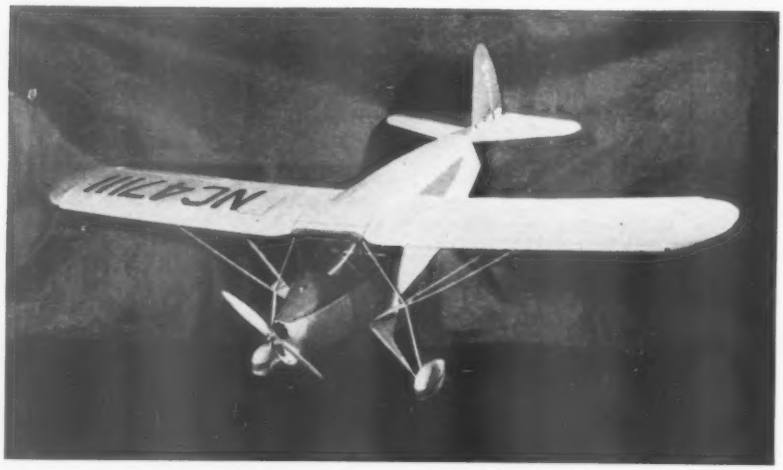
From ½-inch sheet balsa cut the formers and cement them in their proper locations. Five ⅛ x 3/16 inch stringers are attached to the bottom of the formers. These are spaced evenly, as shown on the front view of plan. The top of the fuselage is finished off with five stringers which are attached to former F-9 and continue to rear of the fuselage.

The cabin and hatch in the top of cabin may be installed if so desired. One or the other will have to be installed so that the batteries may be moved back and forth to balance the model. The top of the cabin from windshield to hatch is covered with one piece of thin cardboard.

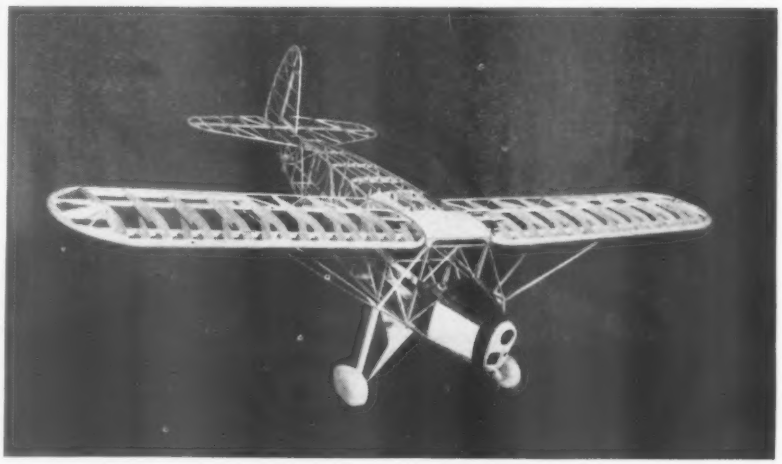
The photo of the framework clearly shows the piece of body which is covered with cardboard and aluminum. One-eighth inch balsa ribs are attached to top of sides of cabin (see side view of plan). After all cross pieces have been inserted in top of cabin, 5/16 inch drilled dowels are cemented in and bound with heavy thread.

A ⅛ inch three-ply veneer firewall is attached to front of fuselage. Drive nails through the veneer and into longerons and upright pieces so that it will hold fast. The motor mount is made from 3/63 inch half hard aluminum or 1/32 inch soft steel.

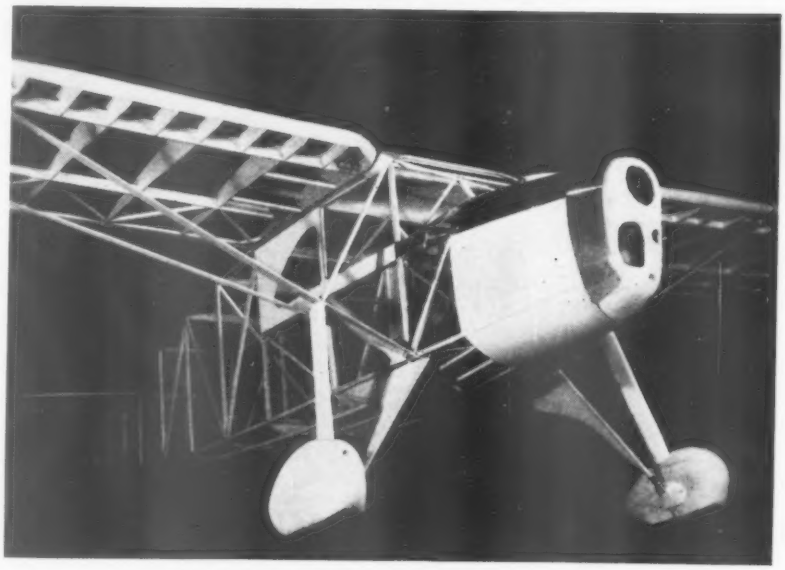
(*Continued on page 52*)



The completely assembled Fairchild Ranger.



Skeleton of the Ranger ready for covering.

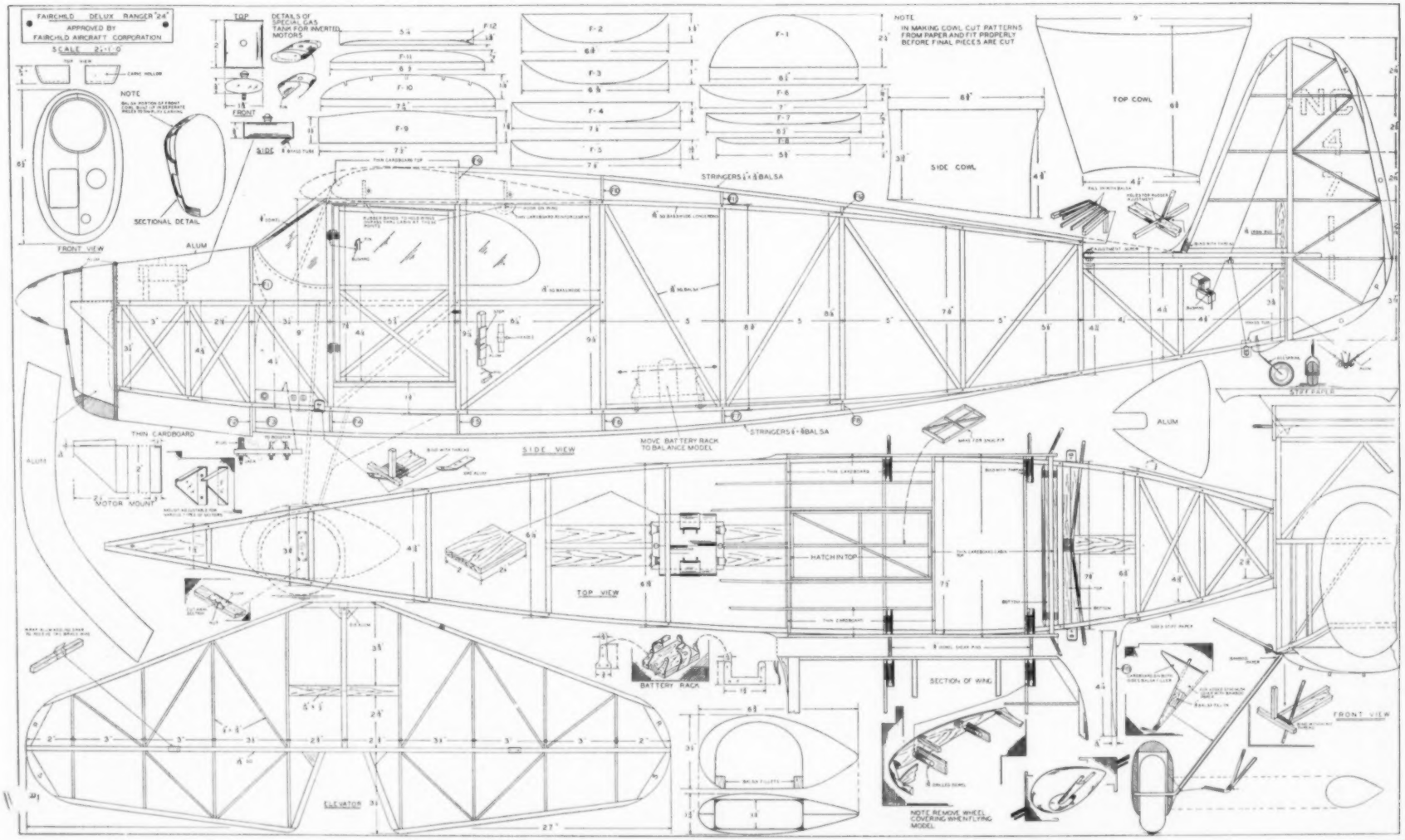


A closeup showing the nose and wing connections.

General Fuselage and Tail Assembly For Fairchild Ranger

Below are the dimensioned details and assembly of the Fairchild DeLuxe Ranger, a gas motored job that puts up an excellent performance. These drawings are authentic, having been approved by the engineers of the Fairchild Corporation.

See page 52 for wing assembly



Fairchild Model

(*Continued from page* 50)

Construction of Landing Gear

The type landing gear used on this model is simple to construct. It consists of two pieces of ⅛ inch spring tempered steel wire. The front piece forms the axles for the wheels and continues up into the fuselage. The rear wire is bound to the front wire and continues up and across the bottom of fuselage. When these have been tied in place the balsa fairing is applied to form the struts. Fill in landing gear strut to fuselage with strip of bamboo paper. This gives a finished effect and will not hinder the shock absorbing qualities.

Construction of Elevator and Rudder

The construction of the elevator and rudder is very simple as both are built to the front section, 3/16 of an inch in thickness. Construct upon a flat surface so that they will not have a tendency to warp. The elevator is adjustable by means of an adjustment screw located at the center of the leading edge. Lock nuts may be applied here after the proper setting is had. The rudder adjustment is very simple and is clearly explained in details found on the plans.

Construction of Wing Panels

All ribs are cut from 3/32 inch sheet balsa. Spars, leading and trailing edge then are cemented into place. Do not omit any of the bracing between the ribs, as this is necessary to strengthen them. Five-sixteenth inch dowels are cemented to spars at the root of wings. Bind these with thread or string. The wings carry moveable ailerons, which are a great help when flying the model, as a small amount of wash-in is necessary to counteract propeller torque.

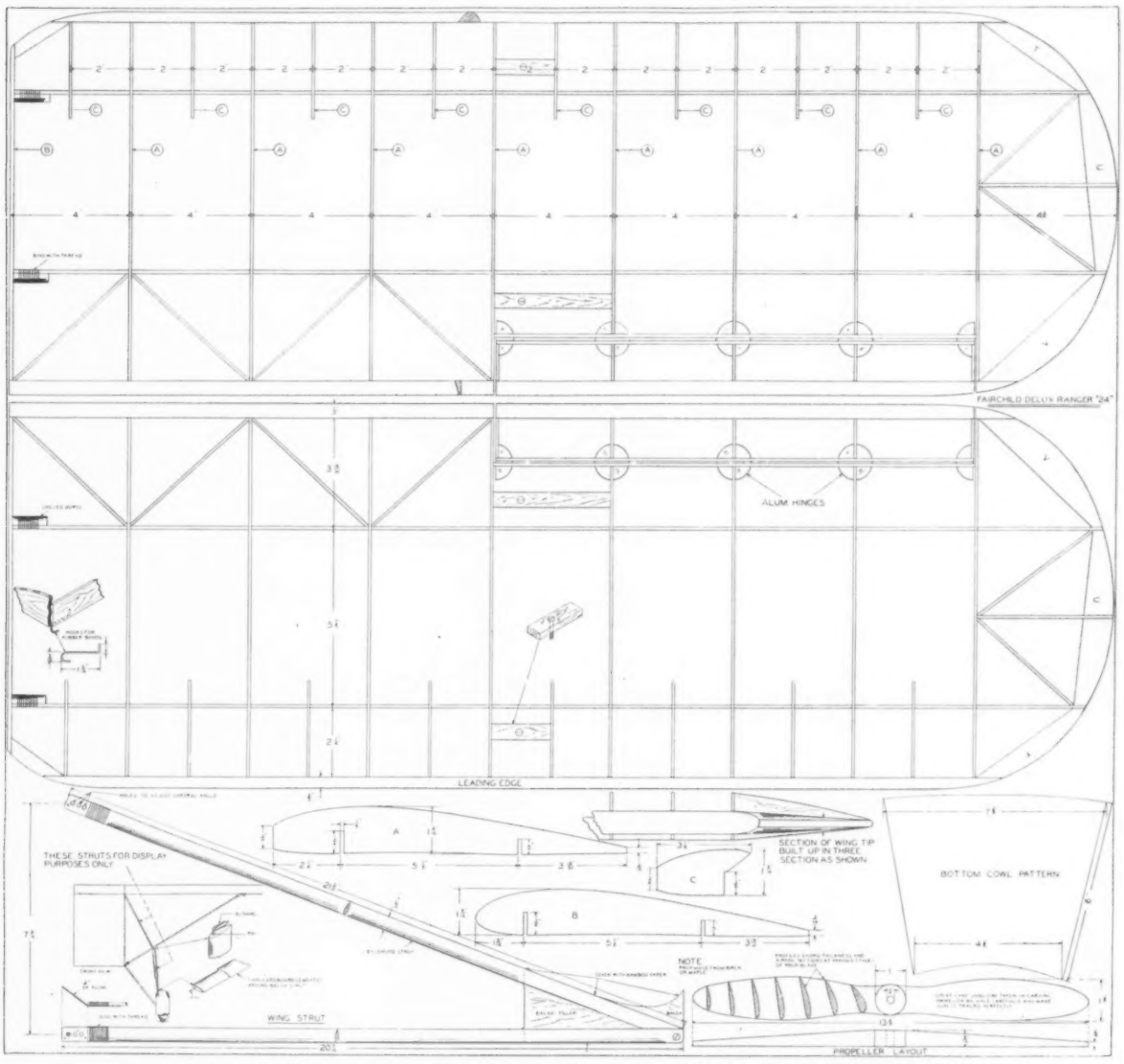
The entire model is covered with a good grade of bamboo paper. In applying the paper to the framework, ordinary model airplane dope will not do.

Ordinary cement, thinned out slightly, makes excellent paper cement. In order to obtain a nice covering job, see that practically all wrinkles are removed.

Do not stretch the paper so tightly over the frame that it will have a tendency to pull it out of shape. After the various parts have been covered, dope with water. This will cause the paper to tighten over the framework. If the brush is used, extra precautions should be taken so as not to tear paper.

Any small spraying device is an excellent means of applying the water. After the pieces have become thoroughly dry, clear dope them. To obtain a smooth finish, a light sanding is given between each coat. To finish off the

(*Concluded on page* 61)



Details of Fairchild De Luxe Ranger wing structure and propeller layout. See page 51 for fuselage details.

A Wing Loading Chart

by RAOUL J. HOFFMAN

Here is a novel method of solving power loading, load factor, wing loading, etc. This is a real labor saver when a number of tentative designs must be compared.

THE structural requirements, as outlined by the Department of Commerce, based on the present development of the science of airplane engineering insure a safe design on conventional lines. Airplanes of special design require other consideration.

The standard specifications are for the expected increase in loads encountered during flights. This increase is due to the balancing and maneuvering of the plane and to the up and down gusts. Fifty percent is added as a safety factor. This final load is called the design load used in the stress calculations.

The accompanying chart is constructed from the formulae for loads normal to the wing chord as given in the bulletin of the Department. The nomographs consist of two sets of scales, one for the effects of the gusts, and one for the loads expected during maneuvering, with the added 50 per cent for the design loads.

An example will fully illustrate the use of the chart. Find the load factors for an airplane with a gross weight of 1,200 pounds, a power loading of 24 lbs. per h.p., a wing loading of six lbs. per sq. ft., a high speed of 95 m.p.h., a standard wing section and an aspect ratio of six for high angles of attack.

Connect 95 on scale No. 1 with 6 on scale No. 2 intersecting line No. 3; then connect the intersection point on line No. 3 with the aspect ratio on scale No. 4, the line will pass through 6.9 the design load factor due to the gusts.

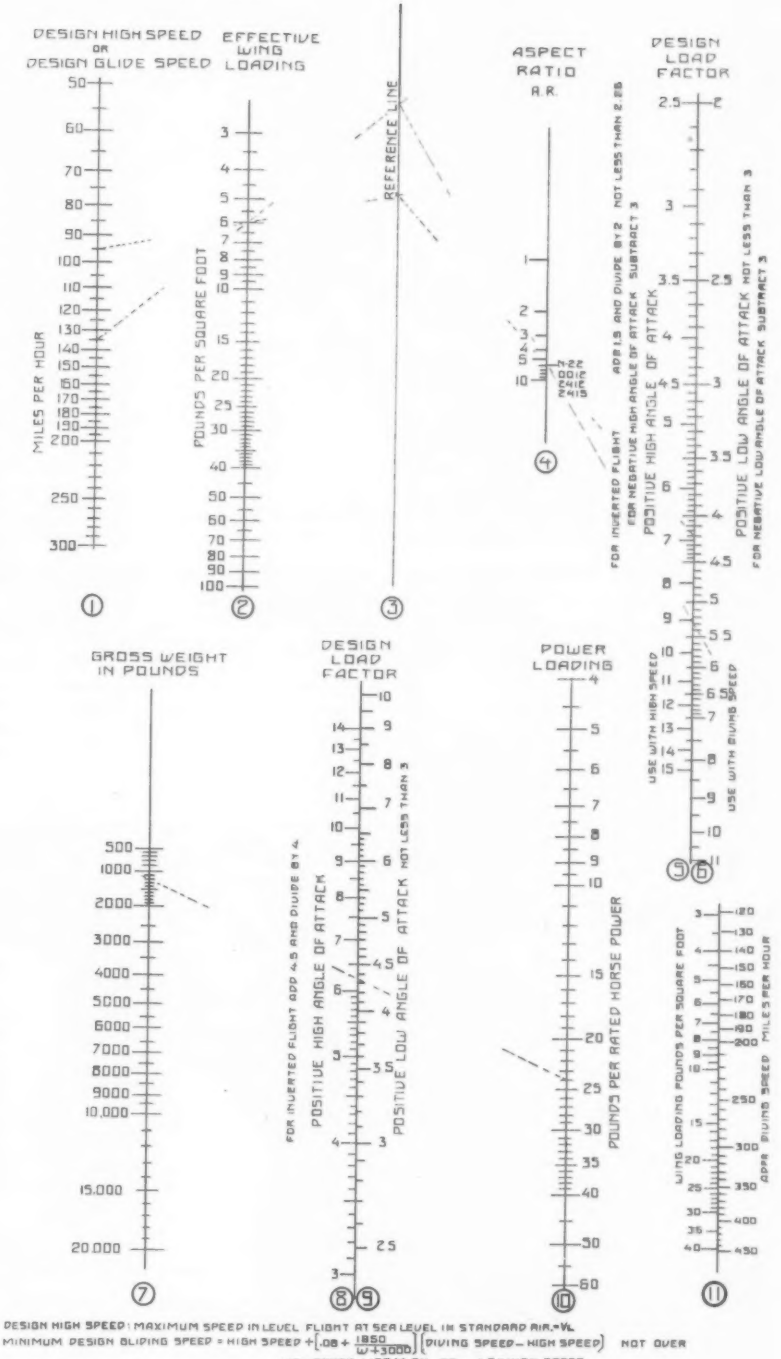
The design factor due to the maneuvering (speed ratio) is found by connecting 1,200 on scale No. 7 with 24 on scale No. 10, the line will intersect Scale No. 8 on 6.3.

The higher one, 6.9 is taken for the design load factor. The chord load is usually taken 20 per cent of the beam load pulling forward, which in this example will be 6.9 times .20 or 1.38, with the center of pressure in the most forward position.

To estimate the load factor for positive low angle of attack, the gliding speed must be determined by using the formula noted on the chart. The required magnitude of the diving speed can be approximated by the use of scale No. 11.

For above example the gliding speed will figure 135 m.p.h., and to be not over 95 plus 102 or 197, or not over 1.5 times 95 or 142.5 m.p.h. 135 m.p.h. will be the value used. Connect 135 on scale No. 1 with 6 on scale No. 2 intersecting line No. 3; then connecting this point with A.R. 6 the line will pass through 5.25 on scale No. 5.

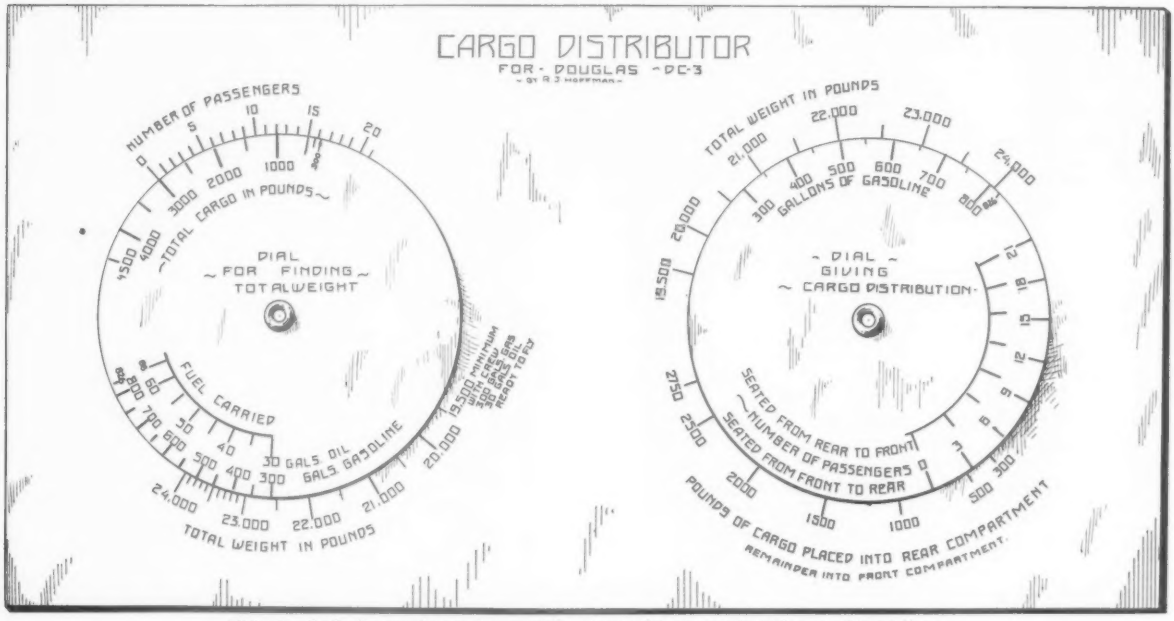
(*Concluded on page* 61)


DESIGN HIGH SPEED OR DESIGN GLIDE SPEED
MILES PER HOUR
EFFECTIVE WING LOADING
POUNDS PER SQUARE FOOT
REFERENCE LINE
ASPECT RATIO A.R.
FOR INVERTED FLIGHT ADD 1.5 AND DIVIDE BY 2 NOT LESS THAN 2.25
FOR NEGATIVE HIGH ANGLE OF ATTACK SUBTRACT 3
DESIGN LOAD FACTOR
POSITIVE HIGH ANGLE OF ATTACK
POSITIVE LOW ANGLE OF ATTACK NOT LESS THAN 3
FOR NEGATIVE LOW ANGLE OF ATTACK SUBTRACT 3
GROSS WEIGHT IN POUNDS
DESIGN LOAD FACTOR
FOR INVERTED FLIGHT ADD 4.5 AND DIVIDE BY 4.
POSITIVE HIGH ANGLE OF ATTACK
POSITIVE LOW ANGLE OF ATTACK NOT LESS THAN 3
POWER LOADING
POUNDS PER RATED HORSE POWER
USE WITH HIGH SPEED
USE WITH DIVING SPEED
WING LOADING POUNDS PER SQUARE FOOT
APPR DIVING SPEED MILES PER HOUR
DESIGN HIGH SPEED: MAXIMUM SPEED IN LEVEL FLIGHT AT SEA LEVEL IN STANDARD AIR.=VL
MINIMUM DESIGN GLIDING SPEED = HIGH SPEED + [.08 + 1850/(W+3000)] (DIVING SPEED − HIGH SPEED) NOT OVER
HIGH SPEED + 102 M.P.H. OR 1.5 × HIGH SPEED.
LOAD FACTOR DUE TO GUSTS = 1.5 + .054 × M6 × 4/(3+6R) × VL/5
LOAD FACTOR DUE TO SPEED RATIO = 1.5 × [.77 + 5200/(W+9200)] .325/P·435
M6 SLOPE OF LIFT CURVE AT A.R.=6
R=ASPECT RATIO, VL = HIGH SPEED
W = GROSS WEIGHT. S = WING AREA
P = LB. P. H.P.

Making Transport Loading Simple

by RAOUL J. HOFFMAN

This easy-to-read, lightning fast cargo distributor should be a boon to airlines.



This simple device can be used accurately at any time to evenly balance a big airliner.

SAFETY and efficiency of commercial airliners, carrying passengers, depends on the correct distribution of the cargo between the rear and the front compartment. This cargo consists of mail, baggage and freight.

No doubt the cargo should be placed so as to give the plane the maximum miles-per-gallon fuel consumption. This is accomplished by bringing the center of balance at a predetermined location supplied by the manufacturer or by the Department of Commerce. Usually certain limits are given for the location on the mean aerodynamic chord.

The correct distribution of the cargo into the front and rear compartments is the duty of the traffic manager of the airliner. Loading charts or a special balancing instrument are used for this purpose.

The accompanying cut shows a simple cargo distributor based on total weights and total moments. The ready-to-fly weight is assumed to be fixed; it includes the crew, 300 gals. gasoline and 30 gals. oil.

Additional loads will be the weight of the passengers, the weight of the fuel and the weight of the cargo, not exceeding a maximum weight. The tanks are filled from the front to the rear; the passengers may be seated from the front to the rear or the rear to the front. This dual position of weights will result in a dual reading of cargo distribution.

The cargo distributor is designed for the Douglas DC-3; data furnished by the American Airlines with certain generalization.

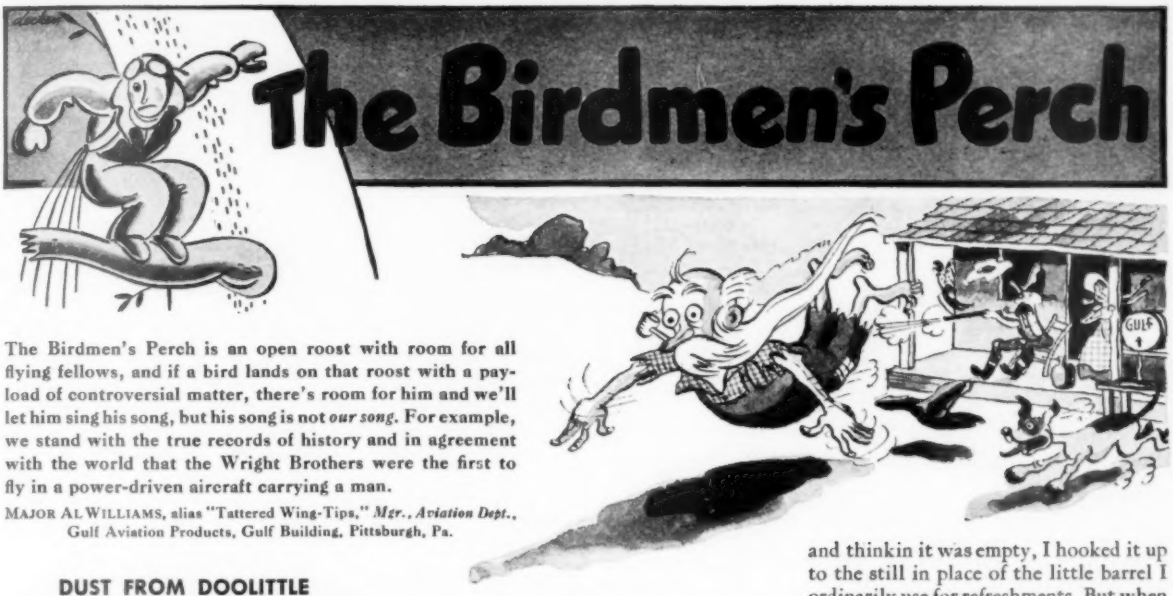
The calculator has two dials: one for the calculation of weight and one for the distribution of the cargo. The first unit is based on the addition of all the loads placed in the plane and the second on the summation of the moments taken about the front cargo compartment.

Since the moment of the cargo in the front compartment is zero, it is only necessary to determine the amount of cargo in the rear compartment. Any remainder is placed in the front compartment.

The two seating positions of the passengers, i. e. front to the rear and rear to the front, gives two cargo divisions. This condition is indicated by two scales shown on the instrument.

The cargo distributor must be in ready reach of the traffic manager and should be of sufficient size to enable instant reading.

END



The Birdmen's Perch is an open roost with room for all flying fellows, and if a bird lands on that roost with a payload of controversial matter, there's room for him and we'll let him sing his song, but his song is not *our song*. For example, we stand with the true records of history and in agreement with the world that the Wright Brothers were the first to fly in a power-driven aircraft carrying a man.

MAJOR AL WILLIAMS, alias "Tattered Wing-Tips," *Mgr., Aviation Dept.*, Gulf Aviation Products, Gulf Building, Pittsburgh, Pa.

DUST FROM DOOLITTLE

"I was running a survey crew on a job just west of the Cleveland Airport, in a wooded valley. We had just got to the top of the bank, but still in the woods when there was a roar and a hell of a wind, and my hat was gone, and my hair was full of old dried bark that fell from the trees above me.

"Well, I got out of that woods in a hurry to see what it was, but could see nothing, so I waited.

"Finally, along comes Major Jimmy Doolittle in No. 11, Granville Brothers 'Winged Beer Barrel.' When he passed over the trees, near where I had been standing, he was so close to them that the 'wash' from his 'prop' was not only tearing off old bark, but actually shredding the green leaves on the tops of the healthy trees. I discovered later that he was tuning up that 'keg' for an assault on the landplane speed record, in which he was successful." —**Chas. E. Evers, Jr.**

EGG COMES TO BAD END...

"You ask whether anyone can give you information as to what happened to Mr. Egg," writes Howard A. Scholle. "As a matter of fact, Durs Egg was a Swiss and not a German, and financed the efforts of his countryman, Samuel John Pauly, in his attempt to construct a dirigible . . ."

It seems that Mr. Egg was gun-maker to King George III. And that construction was started on Pauly's "Dolphin," a fish-shaped balloon, 85 feet long and 15 feet high, at Knightbridge in 1816.

The trim of the ship was controlled by a box of sand that could be run from the cockpit to the stern by pulleys. The dolphin-like lines of the main bag were maintained by an inner bag, which was inflated with air, and which replaced the valved gas.

The Dolphin never flew. Pauly died before it was finished. And Durs Egg was left literally holding the bag for the £10,000 he had invested.

However, years later P. T. Barnum, of one-every-minute fame, inflated the small inner bag of "Egg's Folly," and sent his dwarf, Tom Thumb, up for a successful flight . . .

There now, we hope that Egg is done to a turn.

Gulf Airline Oil is refined by the exclusive Alchlor Process that continues refining where other processes stop. By actual tests, *it yanks out as much as 20% more black, sticky waste than other processes.*

Gulf Airline Oil is 100% Pure Pennsylvania. It's the aviator member of the famous *Gulfpride* family—and it's the world's finest oil for planes.

THIS MONTH'S WHOPPER

"I sure think your corporation ought to pay for my hound dawg Bess.

"I set considerable store by that dawg, Major, and she got hurt bad at the dance last nite, on account of one of your Gulf Aviation gasolene drums. Them flyin machine fellers left it down in the holler, and thinkin it was empty, I hooked it up to the still in place of the little barrel I ordinarily use for refreshments. But when them folks tasted that run last nite, all jerusalem started poppin.

"One nip, and old Ant Josie Bumstead was leap froggin over six of the boys at a swoop. Evan Williams' boy Jabez, that plays the banjo, puts his foot through three inches of solid pine floorin and his banjo goes sailin off playin 'Joseyphine in My Flyin Machine' all by itself.

"Now granpappy's been paralysed since ten years ago he found he couldn't spit over the railin, so I didn't bother none when I seed Harry Zepp give him a swig. But dawggone if granpappy didn't fetch right up outten that chair, flap his el-

bows, and whizz right offen the porch so much like a partridge that, fore he knows it, Harry had shot him both barrels and ole Bess was off to retrieve him.

"Major, that hound was a mighty fine hunter and she got a sprained back bringin in granpappy. It was yore high power gasolene done it, so I think you ought to pay $10.

"An please send it return male, because we ain't got no money to plant granpappy with." —**Lem Gribben's Boy, George**

Gulf Oil Corporation and Gulf Refining Company . . . makers of

GULF GULF AVIATION PRODUCTS

Taxi Drivers of the Sky

(*Continued from page* 44)

Mexican consulate," Mantz relates, "and then I discovered that the other Latin-American consulates were closed for the day. Waiting until morning was impossible if I was to get to Balboa on time."

He rechecked his maps and found that the whole 3,600-mile trip could be made with only one stop south of Mexico. Managua, Nicaragua, was about half-way from Mexico to Panama and a necessary fueling stop. He decided upon a gamble, and took off just about dark.

At Nogales, Arizona, he cleared Customs and sailed over Mexico, stopping at Mazatlan, Acapulco and Tapachula. At this last stop he was told that it was impossible to fly further south without the proper papers. His watch showed him it was 5:20 p. m.

"Why, you fellows are working overtime!" Mantz exclaimed. "You should get paid extra for that." He laid several notes on the counter.

After a few moments of pleasantries, during which the notes disappeared, the authorities finally agreed that it was nobody's business what happened to Mantz after he left Mexico. But they did let drop a warning that down in Costa Rica there was a plane armed with a machine gun, set upon breaking up bootleg flying.

"I side-stepped that by going out to sea 12 miles, around not only Costa Rica, but every country for which I did not have the proper calling cards," Mantz said casually. "All except Managua, of course, where I had to land—but Americans there helped me over that hurdle and things went off beautifully."

Wednesday night, as scheduled, he picked up his passenger at Balboa and Friday evening they were back in Los Angeles.

At Glendale, Joe Plosser's Grand Central Flying Service two-place airplanes fly in and out of the airport from dawn to dark, training scores of pilots in one of the most complete courses offered, but at one side are a couple of big cabin planes —and when they roar off the field it means that Plosser is away on another charter jaunt.

"Few people realize what charter flying really involves," Plosser will tell you. "We have so consistently carried out flights that not many of our patrons consider the problems they involve. In fact, we are called upon to complete flights as speedily and efficiently as the airlines, but all too often without radio beam or beacon guidance.

"Charter flights usually take one off the established airways and night landings on unlighted fields are nothing new, yet the percentage of mishaps is amazingly small," he points out.

"When we are taking our passengers to established airline terminals over marked airways and can fly with the aid of radio beams our problem is comparatively simple—but more often our charters are to places off the established airways—for the simple reason that a chartered plane is the fastest way to get there," Plosser adds.

Out-of-the-ordinary flights charter pilots now are called upon to make offer further evidence of the air-mindedness that is growing so rapidly in the public consciousness.

In recent months, Joe Lewis has been called upon to use his ambulance ship to bring back to Los Angeles the body of a man killed several hundred miles away in an automobile accident; Paul Mantz has had several aerial funerals, when relatives of the deceased have engaged him for the task of strewing their loved one's ashes over the sea; nearly all the charter operators have been called upon by newspapers to carry their reporters and photographers on rush assignments best covered from the air; and only recently, with the opening of the trout season, one of the operators carried a party of wealthy fishermen to a meadow high in the mountains, left them there for several days, and then went back to return them to civilization.

All this evidence of the rapid growth of the aerial taxi business brings up in the public mind the cost of airplane charters. There is no secret about the rates. Every operator has his established rate card.

"Americans Are the Most Discriminating People in the World"

•

Somewhere we remember a very wise man who uttered the quotation above and when we established Eastern Air Schools it was with the thought that American aviation is the most discriminating industry in the world. American aviation demands the best that its personnel can give and it demands that its personnel have the finest training that American schools can give. That is why we have spared no expense in making Eastern Air Schools the finest school that could be established by obtaining the best instructors that could be gathered from commercial and military aviation. Eastern's instructors are men who came to Eastern directly from active service in the military forces or from active commercial aviation. Eastern's equipment was bought after consultation with authorities from all branches of aviation and while it is unpretentious, it is modern, safe and complete. Eastern's policy is one of eternally searching for ways to improve its personnel, equipment and curriculum to produce graduates with the finest training obtainable. Investigate this better school before you decide, it will mean a better start in your aviation career.

•

EASTERN AIR SCHOOLS INCORPORATED

Complete Aeronautical Education

SALISBURY NORTH CAROLINA

"IN THE HEART OF DIXIE"

and in most cases they run fairly close together for comparable equipment.

The Lewis Air Service rates furnish excellent examples. A few of the prices, on a four-place Lockheed plane with a cruising range of 900 miles, may be interesting. The rates are all for four passengers and are quoted on a round-trip basis:

Bakersfield, $40; Ensenada, $90; Flagstaff, Arizona, $200; Grand Canyon, Arizona, $200; Palm Springs, $50; San Simeon, $75; Tucson, Arizona, $185, and Yuma, Arizona, $125.

Additional costs for night flights, waiting time, stop-overs and special services are always subject to adjustment before a flight is undertaken, especially for charters where the normal fee is more than $150, the Lewis rate card specifies. This also applies to charters of the ambulance plane, or planes of two or three passengers capacity, or more than four.

An interesting aspect of the charter rates in effect in Southern California is that on comparatively short flights, the cost for four passengers on a round trip basis is only slightly more than regular airline rates; while on longer flights the charter rate is usually considerably less.

For example, four persons traveling to Las Vegas, Nevada, and return by airline would pay $100.08 as against a charter price of $125; to San Francisco and return, $136.44 by airline and $140 by chartered plane; and to Salt Lake City and return, $250.22 by airline and $255 by chartered plane.

Over longer distances, on the same basis, charter operators claim an advantage over airline fares. The following table, compiled on May 15 on the same four-person, round-trip basis from Los Angeles illustrates the differences:

City	Airline	Charter
Amarillo, Texas	$407.52	$375
Chicago, Ill.	756.00	695
Denver, Colo.	482.48	340
El Paso, Texas	353.52	285
Kansas City, Mo.	601.20	500
Mexico City, Mexico.	792.00	775
New York City	1079.60	950
Portland, Ore.	389.60	330
Reno, Nev.	219.24	160
Seattle, Wash.	453.08	390

The natural reaction of a layman glancing at this comparison is that the difference in favor of the charter operator is offset by the greater comfort, better navigational aids and higher development of flying ability found on the airlines.

And the charter operators will be the first to enter sweeping denials.

They will show you that their airplanes are every bit as luxurious for their four passengers as the airliners are for their 21; they will prove that the flight training, ability and experience of their pilots and themselves are equal and in many cases superior to the same qualifications of the airline pilots, and they will show you radio and navigational equipment in their planes that duplicates the equipment of the airliners in efficiency.

Some of the charter pilots will tell you that they are themselves former airline pilots, who "quit driving busses to become chauffeurs."

And finally they'll pull out their flight records for the past several years and show a better record for safety, even in proportion to the number of passengers carried, than the airlines!

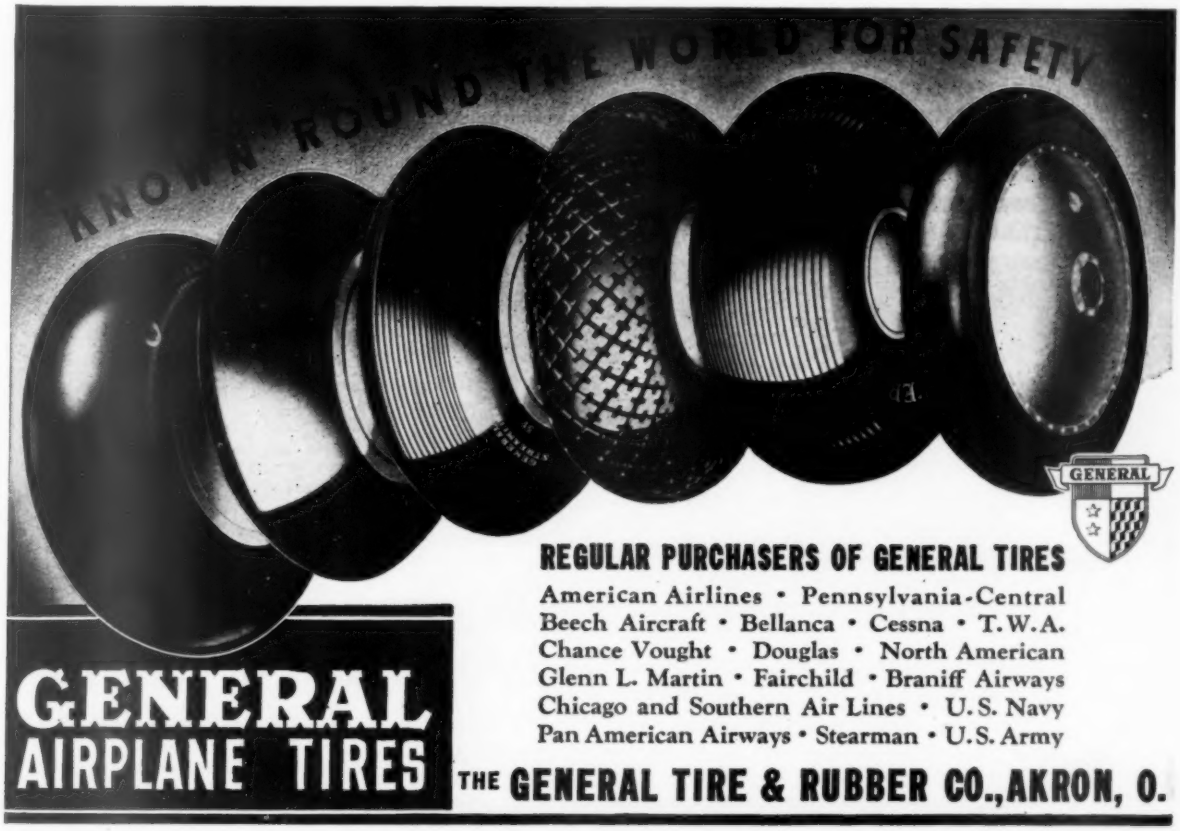
Perhaps the airlines offer greater speed? Not necessarily, say the charter pilots. Even with slightly slower airplanes, the charter pilot is not bound by schedules and will often complete a direct point-to-point flight in quicker time than an airline passenger could. An example is the Reno-Los Angeles flight. An airline passenger must go to Reno by way of Oakland, where a charter pilot will take a direct course.

"Speed?" asks Howard Batt. "I'll beat any airline schedule!" Batt operates Beechcrafts, with cruising speeds of from 177 to 200 m.p.h., in his charter service. Lockheeds, Stinsons and other modern cabin planes operated by the charter services of Southern California will equal or come close to equaling the speed of huge airliners in actual practice, their pilots point out.

Even this situation is due for change. The airlines are soon to have new and faster schedules and then the charter pilots will need new equipment to keep them offering the same proportionate high standard of service.

The fleets of aerial taxies will increase as the airmindedness of the public increases. Perhaps before long Mr. and Mrs. Public will be hailing an air taxi as nonchalantly as they now call a land cab, but to go far—and fast.

END


KNOWN 'ROUND THE WORLD FOR SAFETY
GENERAL
GENERAL
AIRPLANE TIRES
REGULAR PURCHASERS OF GENERAL TIRES
American Airlines • Pennsylvania-Central
Beech Aircraft • Bellanca • Cessna • T.W.A.
Chance Vought • Douglas • North American
Glenn L. Martin • Fairchild • Braniff Airways
Chicago and Southern Air Lines • U.S. Navy
Pan American Airways • Stearman • U.S. Army
THE GENERAL TIRE & RUBBER CO., AKRON, O.

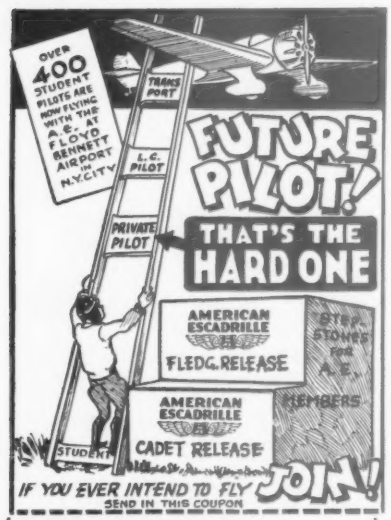
COLT 45 Cal. "FRONTIER" MODEL $1.45

Basswood construction kit with working plans, machined barrel, cylinder and all necessary hardware.

COLT 45 Cal. "FRONTIER" model kit. 4¾" barrel. $1.45
COLT 45 Cal. "FRONTIER" model kit. 5½" barrel. 1.55
COLT 45 Cal. "FRONTIER" model kit. 7" barrel. 1.70
COLT 45 Cal. Automatic Pistol kit. 1.00
Half scale Thompson Sub Machine Gun model kit... 1.00
Full scale Thompson Sub Machine Gun model kit... 3.00
SAVAGE Cal. 32 Auto. Pistol kit, machined barrel.. .75
LUGER Auto. Pistol with 4" machined barrel..... 1.75
LUGER Auto. Pistol with 6" machined barrel..... 1.90
COLT 25 Cal. Automatic Pistol kit..... .50

These beautiful kits are complete in every detail and made of the best basswood. All parts are cut to shape and require only a short time to finish. Postpaid in U. S. A.

GUN MODEL CO.
Dept. K-30 2908 N. Nordica Ave. Chicago, Ill.



AMERICAN ESCADRILLE (Dept. A)
Floyd Bennett Airport, Brooklyn, N. Y.

GENTLEMEN: Herewith is 50 cents which entitles me to the SPECIAL MEMBERSHIP in the American Escadrille. The entire list of Cadet Maneuvers —and bulletins.

Name..... Age.....
Street.....
City..... State.....

SUFFALO PUBLIC LIBRARY,
DEPARTMENT OF TECHNOLOGY,

Baynes

(Continued from page 39)

ficulties that prevent wider use of them. Other advantages are that there is no danger of passengers getting in and out running in to them, and there is less noise in the cabin. The radiator for the water cooling system lies on its side in the wing. Air is forced in from underneath, through the radiator, and out the top of the wing with very little deflection from its original path.

The main aim of the designer, Mr. L. E. Baynes, has been to keep the price as low as possible, and to this end he has evolved a remarkably light and simple wooden structure. The fuselage is a ply covered box, with spruce members and a sloped decking along the top. The wing is built around one unusually large box whose width is about one-third that of the wing chord. Like the fuselage, it is made up of ply-covered spruce. Over this, light wooden ribs are laid. The leading edge is covered with plywood and the remainder of the wing with fabric. The cantilever tail surfaces are constructed in a similar manner, the elevators being provided with trimming tabs.

The method of folding the wings is particularly novel and interesting as well as surprisingly simple. It has been made possible only by the complete enclosure of the engines. The wing is mounted on a turntable at the center line of the fuselage, and when two locking pins have been removed, it swings round on a single pivot attached to the rear face of the spar, until it is in line with the fuselage. The widest part of the ship then left projecting is the stabilizer, which is only 9 ft. in span. The only disadvantage is that the overall length is increased by an amount equal to about one quarter of the wing span. In order to allow the wing to pass over the rear of the fuselage, the top decking is hinged so that it can be split along its center line and folded down each side. Whereas most methods of wing folding mean a large amount of extra expense and weight, the weight and most of Mr. Baynes' method is negligible.

The wide fuselage necessary for the roomy side-by-side seating arrangement has enabled the designer to do away with practically all landing gear drag. The landing legs are attached to the fuselage sides on the inside, so that only the bottom halves of the wheels project outside the fuselage. This arrangement has all the advantages of a retractable gear with none of the attendant disadvantages of weight, expense and risk.

The cabin is wide and comfortable with full upholstery. Luggage space is behind. There is a door on each side and the nearness of the fuselage to the ground, and the absence of wing struts and props make getting in and out easier than with an auto. The glass roof, high wing, enclosed engines and pusher props combine to give the pilot almost perfect visibility in every direction. Dual controls are included, space being saved by arranging a single control column in the center of the cabin with branches to each side. The rudder is operated by hanging stirrups. Observant readers may have been surprised to see from the photographs that mass balances are fitted to all the control surfaces, which seems unusual on a light airplane, but in Britain they are compulsory on all craft, large or small. It is expected that the price will be below $3,000 which is remarkably low, for one must remember that any airplane costs more to produce in Britain than it would in the U. S.

SPECIFICATIONS

Dimensions.
Span: 29 ft. 10 in.
Length: 23 ft.
Height: 4 ft. 9 in.
Width folded: 9 ft.
Length folded: 29 ft. 10 in.
Wing area: 141 ft.

Weights.
Weight empty: 80 lbs.
Disposable load: 470 lbs.
Gross weight: 1,350 lbs.

Loadings.
Wing loading: 9.55 lb. sq. ft.
Power loading: 16.87 lb. per h.p.
Span loading: 1.51 lb. per sq. ft.

Performance.
Maximum speed: 110 m.p.h.
Cruising speed: 100 m.p.h.
Stalling speed: 40 m.p.h.
Rate of climb: 700 ft. per min.
Duration with 210 lbs. payload: 3 hrs.

END

KOLLSMAN FOR PRECISION

KOLLSMAN

PRECISION

AIRCRAFT INSTRUMENTS

KOLLSMAN INSTRUMENT COMPANY
INCORPORATED
8006 45TH AVE., ELMHURST, NEW YORK CITY, U.S.A.
Western Branch—Grand Central Air Terminal, Glendale, Cal.

MODEL AIRPLANE IGNITION COILS
Manufactured by
SEVISON MAGNETO ENGINEERING CO.
377-397 Phillips Ave. TOLEDO, OHIO

"I Stepped Out Into Space . . . "

(*Continued from page 38*)

'chute. Glancing down past my feet I noticed I was drifting sideways. I reached up, pulled down the riser I'd found would turn me in the direction I wanted, and held it. The whole 'chute swung around and, when I was headed directly into the wind (just like an airplane landing) I released the riser and the turn stopped instantly. The ground started to come up a little faster. I noticed that all yelling on the ground had stopped. As I floated closer to the field I could see that everyone had stopped talking and were intent on my landing. Only sound was an excited announcer yelling a description of the "parachute landing procedure" at the quiet crowd.

Suddenly the ground appeared to be rushing at me. I relaxed my legs so that I'd collapse easily. Then, before I hardly realized it, my fall seemed to slacken and my feet touched gently in the airport's high grass. I started to fall over but found that I'd landed so lightly I could remain standing right where I had landed. It was a standup landing!

There, in the space of not more than two short minutes, I had done what everyone had said I was crazy for doing. And, instead of going through any of the "death-defying plunge" that had been imagined for me, I actually had experienced the most pleasant adventure I've ever had. I had expected a bone-jarring crack up there when the main canopy filled. I got just the opposite.

I had expected a breath-taking plunge as I dropped into space. Instead, I got the most pleasant "ride" I've ever had. In other words, nothing my—and various other—imaginations had plotted for me actually took place.

But don't get me wrong. Making a parachute jump is not just duck soup for anyone who happens to be so inclined. On the contrary, this dare-devil business has no place in a good, sane 'chute jump. That "daring" frame of mind is most dangerous. One's imagination can play tricks that, especially while falling head over heels down the sky, can be very disastrous. All you actually need to be perfectly sure of safe parachute operations is just plain common sense; no tricks, no special endowments of "sheer courage."

Remember, there are hundreds of men alive today who wouldn't be if it hadn't been for this remarkable aerial life-saver.

END

Announcing

THE LUSCOMBE SCHOOL OF AERONAUTICS

The LUSCOMBE plan of apprenticeship training, originally designed to train men exclusively for THE LUSCOMBE AIRPLANE CORPORATION, has now been extended and broadened by popular demand into a separate and self-sustaining institution. The success of LUSCOMBE trained men throughout the aviation industry has been responsible for the organization of THE LUSCOMBE SCHOOL OF AERONAUTICS to continue and augment the original LUSCOMBE plan.

YOU can now receive the training that has been proven by experience to be so successful in training others for technical positions in aviation.

We offer YOU a nine months technical training embracing a thorough background in theory and the practical application so vital to well-rounded experience. Close association with the developments in the LUSCOMBE factory where new processes, designs and production methods are being tried and proved enhances each student's knowledge and adds to his training a useful interest in the vital problems of an actual manufacturing unit.

The training you receive now will affect your future progress in aviation. Send us the attached coupon immediately and we will show you why LUSCOMBE trained men are in demand.

DON'T just wish for a place in aviation—let us show you how to get it.

THE LUSCOMBE SCHOOL OF AERONAUTICS
WEST TRENTON, NEW JERSEY

•

Specialized training in metal airplane engineering and construction

•

Please send me full particulars concerning your nine months technical training course in all metal airplane engineering and construction.

Name.....

Street.....

City.....

State.....

Education.....

Age.....

BUFFALO PUBLIC LIBRARY, DEPARTMENT OF TECHNOLOGY

AT LAST! Here is the greatest companion book on Aviation ever published in America. AVIATION WONDERS OF THE WORLD is simple, practical, comprehensive and pictorial! It covers everything in Flying. 31 Chapters on Airplanes, Airships, Gliders, etc. Written in simple, non-technical language by world-famous aviation authority. A combined handbook, album and encyclopedia. Heavily illustrated, including almost 100 FULL PAGE ILLUSTRATIONS and numerous smaller pictures.

This Great Book Contains These 31 Chapters

1—History of Aviation
2—Types of Aircraft
3—Description of Aircraft
4—Airplane Parts
5—Airships
6—Gliders
7—Parachutes
8—Flying Instruments
9—Navigation Instruments
10—Engine Instruments
11—Aircraft Engines
12—Aerial Navigation
13—Formation Flying
14—Aerial Bombing
15—Air Stunts
16—Catapults
17—The Stratosphere
18—Learning to Fly
19—Airplane Markings
20—Airplanes of U.S.A.
21—Airplanes of England
22—Airplanes of France
23—Airplanes of Germany
24—Airplanes of Italy
25—Airplanes of Spain
26—Airplanes of Russia
27—Airplanes of Japan
28—Seadromes
29—Aviation Records
30—Historical Flights
31—Aircraft of Future

Wonderbook Of Flying

Here is everything you want to know on Aviation. Separate Chapters on Learning to Fly, Airplane Parts, Flying Instruments, Aerial Navigation, Aircraft Engines, Parachutes, etc. Other Chapters on Air Stunts, Formation Flying, Aerial Bombing, Stratosphere, etc. Chapters 7 to 18 practically comprise a flying course for beginners and average students of aviation.

America In The Air

AVIATION WONDERS OF THE WORLD covers every important type of American plane! Amphibians, racing planes, autogiros, passenger airliners, trans-oceanic flying boats, training planes, naval and army aircraft, etc. All types explained with detailed information showing dimensions, power plants, weights, performances, etc. Each of the 42 most important types of American planes carries a FULL PAGE illustration!

See Foreign Air Fleets

AVIATION WONDERS OF THE WORLD shows you the most sensational of all foreign planes. Attack bombers, multi-seat fighters, military transport planes, reconnaissance craft, freight carriers, long-range seaplanes, racers, pursuit and interceptor planes, etc. See the civil and military aircraft produced by England, France, Germany, Italy, Spain, Russia and Japan. Many of these are fighting in the present war in Spain. The most amazing types are reproduced in FULL PAGE illustrations. All planes are described in pictures with detailed specifications.

Chockful Of Information

AVIATION WONDERS OF THE WORLD is fact-filled from cover to cover. Its 256 pages, bound in full cloth, include fascinating chapters and Pictures on History of Aviation, Aircraft of Future, etc. Answers all questions on speed records, distance and height statistics, historic flights of all kinds, epoch-making airplanes, etc.

SEND NO MONEY!

Send name and address only. We will ship book at once. On Delivery, pay postman only $1 plus a few cents postage. Or send $1 now and save mailing costs. Money back within five days if not satisfied. (No foreign orders filled at this low price.)

FREE OFFER

METRO PUBLICATIONS, Dept. 3510
70 Fifth Ave., New York

Send AVIATION WONDERS OF THE WORLD for free examination. On delivery I will deposit with postman $1 and a few cents postage. If not satisfied I may return book within 5 days and my $1 will be refunded.

Name.....
Address.....
City.....State.....

☐ CHECK HERE if you want to save postage charges. Enclose only $1 with this coupon and we will ship prepaid.

The Hammond

(*Continued from page 32*)

a tiny bit more than ships of equal horsepower.

When you have satisfied yourself that her turns are beautiful, though a bit heavy, Tommy Fowler insists on showing you the stall performances with and without power. This is just a waste of time as far as you are concerned because by then you wouldn't care if she had the most wretched spin characteristics in the world. You are so enthralled at the idea of steering an airplane without throwing your hip out of joint. Then comes the landing.

I landed this airplane without flaps, with one set of flaps and with the additional 20 degrees of flap setting. However, I couldn't land it what you call "properly." Lord knows I tried to smack the nose on the ground, but the years of training wouldn't let me accomplish this desired test. Every time I reached the point just above the ground where you are supposed to level off and squat, I levelled off and squatted. Then the nose wheel settled to the runway as we lost speed or applied the brakes. Unfortunately, too, I was unable to satisfy myself as to how much of a wallop that nose wheel actually will take.

All in all the radical departure is a pretty welcome one. It's about high time that we got away from hangover wartime airplane design. Lloyd Stearman and the Hammond boys have reached far into the future and come up with quite a nice handful. Yet let me hasten to add that, Col. Johnson to the contrary notwithstanding, the ship is in no way, shape or form, foolproof. I can think of a good many ways a man can carelessly kill himself in this type of aircraft. But then, you can break your rump on a pair of roller-skates. However, the Stearman-Hammond Y does still further reduce the technology of flight, and thereby bring aviation much closer to the needs and requirements of Johnnie Q. Public.

END

Knight Twister

(*Continued from page 35*)

whole job is remarkably clean. It is America's answer to the Flying Flea of France, for both planes are approximately the same size.

The following specifications covering the general dimensions of the Knight will emphasize the extremely small dimensions and compactness of the new Knight Twister Model KTD-2:

Span, upper wing.....	15'-0"
Span, lower wing.....	13'-0"
Wing area	55 sq. ft.
Overall length	13'-6"
Propeller diameter....	4'-10"
Horsepower	70 h.p.

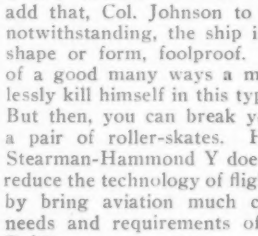
While there are many arguments against the use of a biplane cell from a theoretical aerodynamic standpoint, yet they are highly practical in actual service. They are more compact for a given area and are far more rigid so that the loss of two or three per cent in aerodynamic efficiency is more than offset by the improved safety factors and the improved stability which comes with the proper adjustment of the wing cell.

As a further compensation for the loss of lift in a biplane cell, the wing structure is considerably lighter than the cantilever type and the arrangement makes it possible to employ thinner wing sections with higher L/D values.

The Douglas Ford conversion has been described before in P.A., but we will repeat that the Douglas system of aircooling the Ford marks a great advance in Ford conversion because it does away with the heavy and troublesome water-cooling system used in other conversions and therefore eliminates the dangers and troubles incident to water cooling.

The high speed and rate of climb made possible by the application of a full 70 h.p. will seem astounding to many light-plane enthusiasts who are accustomed to dealing with engines developing a feeble 15 to 40 horsepower.

END



SENSATIONAL

OLYMPIC CANDID

WITH F4.5 LENS AND SHUTTER SPEED up to 1/150 $10.95

Here is an outstanding value that is beyond comparison. The Olympic Candid is a better camera, built to give you perfect results with the greatest economy. It's operation is simplified so that any beginner as well as the most demanding enthusiast of Candid Photography will get perfect pictures. It is equipped with a F 4.5, 50 MM, UKAS ANASTIGMAT Lens in a Critical Focusing Mount, PRONTO Shutter and speeds of 1/25, 1/50, 1/100, 1/150, Bulb and Time. Iris Diaphragm adjustments of F 4.5, 6.3, 9, 12.5, 18 and 25 make it possible to take pictures under any conditions. Use the economical No. 127 V.P. film and takes 16 perfect pictures on one roll of film. Excellent Natural Color pictures are simple as Black and White with this camera. Print size is 1⅛ by 1¾. Telescopic View Finder, Film Counter, Cable Release and Built-in Tripod Socket are additional features. The same camera is available with a Compur Shutter and built to use 35 MM film in daylight loading spools which do not need rewinding after exposure. $15.00. ORDER NOW for these sensational cameras at only $10.95 with Pronto Shutter, or $15.00 with Compur Shutter POSTPAID—C.O.D., if preferred, plus postage.

CANDID CAMERA SUPPLY CO., Dept. 404B 303 W. 42 St., NEW YORK, N. Y.

Sextant

(*Continued from page 28*)

is to be subtracted from the amount obtained by the previous subtraction. hence:

51°-12′ = 50°-72′
7°-32.9′

43°-39.1′ Latitude

Thus, by two simple arithmetical operations we have determined our latitude with sufficient exactness for any ordinary purpose. By comparing the figures with those on the map, the location can be more clearly visualized by its relative location to a town, river or lake.

The determination of latitude by means of the North Star is even simpler than with the sun from a mathematical standpoint, but to the inexperienced person it is usually a difficult task to locate such a faint image in the mirror. After the star is located; the angle is measured as with the sun. The elevation of the North Star is then equal to the latitude of the point at which the reading was taken. Thus, if the angle of elevation of the star is 43 degrees then the latitude is also 43 degrees.

All in all, the staff of POPULAR AVIATION have found this to be a most interesting and practical little instrument for the purpose intended, and it is quite accurate or sufficiently accurate for the distances traversed over land by planes.

END

Model Dept.

(*Continued from page 52*)

model, color coats are applied. Color used on this model is light gray trimmed in red with white pin stripes which may be applied with an ordinary draftsman's ruling pen. It is best to keep the lacquer thin enough so that it will flow freely. This will require an extra coat but the results obtained are well worth the extra effort.

Extra precautions are required in assembling the model as proper alignment of pieces must be obtained so that the model will fly properly. Please bear in mind that a little thought and study at this point will save many hours of additional labor in repairing your model.

If the wings are not exactly in alignment and are not square with the fuselage or if the angles of the two panels are not exactly the same, then the model will not fly properly and will be difficult to control. Careful measurements should be made in checking up these points.

Next, make sure that all connections are tight and that the power plant is amply secured upon the engine bed.

This model was successfully flown before the plans were given their final okay. So we advise you to adhere strictly to the directions in the plans.

One of the most important points to observe in making a test flight is to avoid obstacles and rough ground.

END

Design Loads

(*Continued from page 53*)

Connect the intersection point with A.R. 6 on scale No. 4, the line will pass through 5.25 on scale No. 6. The other calculation is accomplished by connecting 1200 on scale No. 7 with 24 on scale No. 10, the line will intersect scale No. 9 at 4.35. 5.25 is used as it is the higher one.

For negative high angle of attack the design load factor is 6.9—3 or 3.9 and for the negative low angle of attack the load factor is 5.25—3 or 2.25. For inverted flight the higher value (6.9 plus 1.5)/2 or 4.2 and (6.3 plus 4.5)/4 or 2.7 is used (4.2).

The design load factors are for the positive angles upward and the negative angles and inverted flight downward. The loads distributed between the beams will depend on the location of the center of pressure at the respective angles.

The chord loads for the low angle of attack is taken from the resultant of the vector diagram or for approximation .15 of the normal loads.

The gross weight considered in above calculations could be reduced by the structural weight of the wing itself, which would result in a less conservative estimate.

This chart will be helpful to the home builder for obtaining the load factors required by the Department. It indicates clearly the influence of the gusts on airplanes having light wing loading.

END

NOTICE!
MODEL "E" AND ALL FUTURE BABY CYCLONES CAN BE PURCHASED ONLY DIRECT FROM FACTORY —YOU SAVE DEALER'S PROFIT!
New Improved
MODEL "E"
BABY CYCLONE
THE BIGGEST NAME IN LITTLE ENGINES
Now $12.50

MAIL COUPON TODAY

Major C. C. Moseley, President Aircraft Industries
Grand Central Air Terminal, Glendale, Calif.
Send me postpaid the following. I enclose Post Office Money Order.

Calif. Champ Kit Combination $17.85 ○ Model "E" Baby Cyclone Engine $12.50 ○

NAME _____ Age _____

ADDRESS _____

P-10

Do You Know...

. . . THAT the first of American Airlines great fleet of 21 passenger Cyclone-powered Douglas "Flagships" was flown over 400,000 miles during its first year of service—equal to a round trip flight to the moon!

. . . THAT this Cyclone-powered "Flagship" completed its first year of operation in perfect condition and is now in service as a sleeper plane on American Airlines' "Southern Transcontinental" route.

. . . THAT American Airlines was the first air transportation system in the world to install all-sleeper planes, which have been in operation for more than 3½ years—all powered by Wright Cyclone engines.

. . . THAT American Airlines and TWA (Transcontinental & Western Air) each provide swift, over-night coast-to-coast daily schedules over their respective routes—enabling you to have dinner in New York, breakfast in Los Angeles, and a restful night's sleep in luxurious Douglas sleeper planes, all powered by Wright Cyclones.

. . . THAT Transcontinental & Western Air (The Lindbergh Line) recently installed a fleet of giant Cyclone-powered "Skysleepers" licensed to carry 25 passengers.

. . . THAT the TWA "Skysleepers" are unique among air transports in that they provide both berths for through passengers and a club lounge for those traveling shorter distances. Berth accommodations for 8 persons are located in the forward part of the plane, while the lounge, containing 9 upholstered chairs, is at the rear. While this arrangement permits accommodation of only 17 persons, it provides the maximum in comfort and luxury.

. . . THAT Braniff Airways, operating from "The Great Lakes to the Gulf" recently joined the ranks of Wright Cyclone operators when it installed a fleet of Douglas airliners to supplement a fleet of Lockheed Electras. The new Cyclone-powered Douglas fleet increases Braniff's passenger capacity by 140%.

. . . THAT "The Great Silver Fleet" of Eastern Air Lines is powered exclusively by Wright engines and that all of the luxurious Douglas transports in operation on Pan American Airways System, KLM (Royal Dutch Airlines), Swiss Air Lines, Holyman's Airways, Ltd. (Australia) and other leading airlines throughout the world are powered by Wright Cyclones.

"Fly with Wright the World Over"

WRIGHT
AERONAUTICAL CORPORATION
PATERSON NEW JERSEY

A DIVISION OF CURTISS-WRIGHT CORPORATION

Jimmie Mattern

(*Continued from page 22*)

have had much experience with refueling in the air.

It was Hank who handled the refueling on the famous Reg Robbins—Jim Kelly endurance flight in which their Ryan monoplane, the *Fort Worth* stayed in the air 172 hours to break the existing record held by the *Question Mark*.

During Jimmie Mattern and Reg Robbin's projected Polar flight of a few years ago, it was Hank Jones who handled the hose. The flight was not a success due to the thick fog pervading Fairbanks at that time of the year. Contacts between the Lockheed *Vega* and the Ford tri-motor refueling ship failed and the flight was abandoned.

However, it was valuable experience and it is hoped that no trouble will be encountered this trip. Reg Robbins, famous endurance, speed, and distance flyer will handle the refueling ship. The huge Wasp-powered Ford tri-motor is already in Fairbanks, the tanks are installed, and practice contacts are being made.

During the 45-50 hour flight, Jones himself will take his turn at the wheel. After setting the automatic gyro-pilot, Jimmie Mattern will crawl through the tunnel back to Jones' office. Then Jones will move forward to the wheel. After this Mattern will climb back into the tunnel, stretch out and get a few hours of much needed sleep. This operation has been rehearsed many times so that there will be no confusion. A picture of grim humor might be painted should they get stuck in the rear compartment and be uneable to extricate themselves.

Both flyers are in training for the flight like endurance track men or prize fighters. A strict diet and regular periods of strenuous workouts are enforced by Jack Clark, their representative. An extra wedge of lemon chiffon pie might mean all the difference between success and failure of their project while passing through the inter-communication tunnel.

The scene of preparations was visited by the crew of the record breaking Russian ship. Through a wild maelstrom of photographers, reporters, and ardent fans, Mattern and Jones were introduced to the flyers and showed them about the ship explaining details through their interpreter, Consul Gregory Gokham.

The Russians fired questions with startling rapidity or perhaps it was only my ignorance of the language. However, the Soviet airmen showed an amazing familiarity with both the Lockheed "12" and the Pratt & Whitney *Wasp Junior* engines. Hank Jones cornered Capt. Sergei Danilin, navigator on the flight, and asked him concerning the performance of their instruments at and near the Pole.

Danilin, through the interpreter, stated that approaching the Pole their compass was accurate but when flying away from it to the South, the compass could not be depended on. As to the equipment they carried, Danilin spoke of their "gyro-magnetic" compass which has kept us all with furrowed brows. This is a startling indication of the astounding progress being made by the Soviets in their aviation program. It is only hoped that Jimmy Mattern will be able to bring back to us some real first hand information on technical progress being made over there.

It was interesting to note the reaction of the Russians to aviation equipment and methods in the United States. Shown about the terminal they were acquainted with such ships as the Douglas DST, the new Stinson *Reliant*, the Ryan ST sport, a Lockheed *Electra*, the new Aeronca and the Arrow Sport.

While evincing keen interest, their attitude seemed to be that our efforts were both puerile and nugatory in comparison to their native aviation program. Undoubtedly any of us in the aviation industry would feel the same way about the Soviets were we to inspect any of

EASY TO FLY
EASY TO BUY

A new era in aviation is here—thanks to C. G. Taylor. Now, new thousands can afford to have a plane of their own — to enjoy the skyways with new flying confidence and at new low cost . . Over 36% of all registered light aircraft, today, is C. G. Taylor designed. Crowning this outstanding success is his latest achievement—a truly modern airplane incorporating all advanced features—streamlining, side by side seating, dual wheel controls, automobile type instrument panel, roomy cabin and baggage compartment, wide range vision, improved landing gear and many other progressive developments . . . Already sales are setting new records. Demand has necessitated greatly increased production facilities. See this spectacularly successful new Taylor designed plane. Ask your dealer for a demonstration, or write today for descriptive brochure.

ONLY **$1495** F. A. F. ALLIANCE, O.
$495 down payment and convenient terms

TAYLOR-YOUNG AIRPLANE CO., ALLIANCE, O.
FORMERLY TAYLORCRAFT AVIATION CO.

AVIATION TRAINING
at STEWART TECH (founded 1909)

qualifies men for IMPORTANT Aviation ground position. The MECHANICS and ADMINISTRATION COURSES cover Airplanes, Engines (including Diesels), Drafting, Sheet Metal, Electricity, Aviation Radio, Meteorology, Navigation, Flight Dispatching, Airline Operation, etc. The AIRPLANE DESIGN and CONSTRUCTION COURSE includes Mathematics, Drafting, Aerodynamics, Stress Analysis, Design, etc. All courses have complete technical and practical training to prepare men for any and all Aviation ground work.

Stewart Tech graduates are eligible for Government licenses. Descriptive catalog free. Call or write the Aviation Division.

STEWART TECHNICAL SCHOOL
Dept. 1210 Stewart Tech Building
253-5-7 West 64th St., N. Y. C.
Approved by Bureau of Air Commerce as an
AIRLINE AND ENGINE MECHANIC'S SCHOOL

their equipment. That is both natural and excusable due to any individual's deeply imbedded patriotism.

It is only in the face of actual competition that true superiority expresses itself. Russia, in the short space of two weeks, sent two planes from Moscow to the United States and both of them surpassed any record ever made by an American craft. The second ship was in the air for 62 hours and covered over 6,600 miles. It actually passed Los Angeles, continued on to San Diego and, unable to get down through the fog, turned around and flew back up the coast! Failing to locate March Field in Riverside, they sighted a large pasture near San Jacinto through a break in the fog dropped into it. And there was still 30 gallons of gasoline in the tanks!

Jimmie Mattern asked Col. Mikhail Gromoff, the pilot and commander of the flight, how he had flown the course. He answered: "I throttled down to only 30 per cent power and just maintained flying speed. At no time did we go over 100 m.p.h. We flew at about 15,000 feet and did not encounter ice or snow at any point. We only used oxygen once, while passing over the Rockies."

Jimmie Mattern and Hank Jones will fly farther than the Soviet birdmen did! However, due to their re-fueling in mid-air their flight will not fall in the same record-breaking catagory as the Russians. Their main hope is not to demonstrate the gas capacity of American designs, a definitely immaterial characteristic, but to cut the Russians' time in about half. This should demonstrate real superiority in aircraft design.

Jimmie Mattern explains: "The main object is speed. We hope to cruise at better than 200 m.p.h. from here to the Pole. After passing the Pole why we'll pour the coal to the old bus and really make some fast time. That is providing, of course, that our fuel consumption will be what we have planned.

"We have cut down on weight as much as possible but we are not sacrificing any safety devices. Even though there will be very little overwater flying, from the northern shore of Alaska to the southern tip of the Polar ice pack, we are carrying an automatically inflated life-raft."

Hank Jones says: "Naturally we are not going to do this thing haphazardly. We are taking our time and studying the possibility of every conceivable accident happening during the flight. We are carrying emergency rations consisting of dehydrated vegetables, fresh water, and a ten-foot antenna pole to erect should we be forced down on the ice pack. We will have a small hand generator which will supply enough juice to the radio to enable us to send for one minute or longer. It shouldn't take us more than half of that time to give out our position a dozen times."

From Moscow, *The Texan*, with its history-making crew will tour the capitals of Europe. They plan to be in Paris by August 20th for the start of the Paris-to-Damascus Air Race. This event is one of the secondary reasons for their Polar flight. This is the race which was originally scheduled as a New York-to-Paris venture.

However, due to various complications with which the reader is doubtless familiar, the race is now an all-French project. With a first prize of $70,000, second of $46,000, and third of $32,000 it will draw such internationally famous birdmen as Jimmie Mattern, Dick Merrill, Colonel James Fitzmaurice, Paul Codos, Maurice Rossi, Alexandro Papini, Ernst Udet, Beryl Markham, and many others.

The flight will start in Paris and must be completed to Damascus, in Syria, 1,900 miles away, non-stop. On the return trip, as many stops as necessary may be made. The total elapsed time for the the round trip determines the winner, no handicaps being allowed. Jimmie Mattern's personal mechanic, Fred Federman, and a crew are already en route to Paris to take over *The Texan* in preparation for the race.

Once again the United States is stretching its wings internationally. The Stars and Stripes will soon be winging its way over the North Pole, Moscow, Berlin, Budapest and Paris. And we will wager a thousand francs that within six months there will be at least half a dozen exact replicas of the twin-tailed Lockheed "12" pouring out of different aircraft factories on the continent!

END

New Mead MOTOR SLED READY!

For Home Builders

Now you can easily build Mead's new, streamlined MOTOR SLED at home from drawings, parts or complete Construction Kit! Uses outboard or other engine. Low cost. Amazing speed. Seats 2. ALSO: Ice-Boats, Ki-Yaks, Sailboats. Rush 10c for illustrated literature.

MEAD GLIDERS, 15 S. Market, Dept. 10-E, Chicago

FORDON-BROWN

National Air Show, INC.

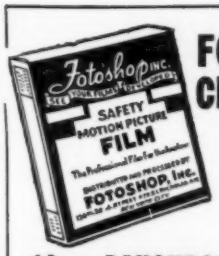
720 BOOK BUILDING — DETROIT, MICH.

PRESENTING

America's Greatest National Air Show!

★ ON NATIONWIDE TOUR WITH Roger Don Rae—Clem Whittenbeck—Capt. Dick Granere—Bob O'Dell—Harold Johnson—Charles Abel—Buddy Batzel—Hugh Thomasson. ★

APPEARING IN DETROIT, MICH.—SEPTEMBER 18, 19



FOTOSHOP CINE FILM

A Quality Product at a Low Price

16mm PANCHROMATIC FILM

MADE EXPRESSLY FOR US BY ONE OF THE LEADING FILM MANUFACTURERS $3.50 Per 100 Ft. Roll (Price includes processing.)

SEMI-ORTHO 16mm FILM $2.19 PER 100 FT. ROLL (Price includes processing.)

TWO ROLLS FOR $4.00

Liberal Allowances on your used equipment. Let us quote on your needs.

Leica Contax Cameras

And Accessory Lenses

AN OUTSTANDING LIST OF BARGAINS IN BETTER MINIATURES IS NOW AVAILABLE.

Liberal Trade-in Values on Your Used Equipment.

SEND FOR LIST NO. 22

A FEW BARGAINS FROM OUR COMPLETE LIST

Reconditioned and Shopworn Cameras

MINIATURE CAMERAS

Dolly ½ and full V.P. F4.5 lens	$14.50
Foth Derby ½ V.P. F3.5 lens	16.95
Welti 35mm. F2.9 lens	36.50
Dolly ½ V.P. F.2 Xenon lens	45.00
Super Nettel Tessar F2.8 lens	72.50
35mm. Retina F3.5 lens	34.50

GRAPHIC AND GRAFLEX TYPE

3¼x4¼ Speed Graphic Tessar F4.5 in compur shutter	87.50
P.C. Speed Graphic Kraus F4.5 lens	59.00
4x5 Speed Graphic Xenar F3.5 lens in compound shutter	98.00
3¼x4¼ R.B. Graflex F4.5 lens	59.00
4x5 R.B. Graflex F4.5 lens	65.00
P.C. Zeiss Mirroflex Tessar F2.7 lens	150.00
P.C. Mentor Reflex Tessar F4.5 lens	49.50

FILM PACK CAMERAS

6x9cm Kawee F4.5 lens	21.50
9x12cm Zeiss Tessar F4.5 lens, new style compur shutter	42.50
9x12cm Recomar F4.5 Xenar lens	42.50
6x9cm Bee Bee Trioplan F2.9 lens	42.00
3¼x4¼ Linhof Zenar F3.5 lens	60.00

SOLD ON A TEN DAY FREE TRIAL
MONEY BACK GUARANTEE

Liberal Trade-in Allowances on Used Equipment
SEND FOR COMPLETE BULLETIN NO. 24.

FOTOSHOP, INC.

136 West 32nd Street, New York City
Dept. B.D.

Lockheed Planes

(*Continued from page* 18)

The tail surfaces consist of two sets of fins and rudders, a split elevator and a single stabilizer fixed solidly to and cantilevered from the fuselage. There is a trimming tab for longitudinal balance on the elevator, and on each rudder there is a tab for trimming for single-engine operation. The fins and horizontal stabilizer are of multi-cellular construction with the stabilizer in five sections. The structure of the rudders and elevators consists of light channel ribs attached to a beam which at the root becomes a torque tube.

The landing gear can be retracted either electrically or by hand. The gear mechanism is driven by a small electric motor.

There are several versions of the *Electra*, the difference lying mainly in the various engine installations. The *Electra* 10-A is equipped with two Pratt & Whitney Wasp Jr.'s rated at 400 h.p. each. The 10-B has two Wright Whirlwinds rated at 420 h.p. each. The 10-C is powered by two Wasps rated at 450 h.p. each, and the 10-E is equipped with two Wasps rated at 550 h.p. each. As the engines increase in horsepower the weights become greater and as different engines are installed with higher horsepower ratings the weights of all the models are variable ranging from 6,300 lbs. empty and 10,000 lbs. gross on the 10-B, to 7,100 lbs. empty and 10,500 lbs. gross on the 10-E.

The Air Corps recently purchased a few *Electras* that have been designated as C-36's and are used for transporting government officials. The Navy and U. S. Coast Guard also have purchased *Electras* for transport purposes. They are known as the R20-1 in the Navy, and the R30-1 in the Coast Guard.

Soon after the *Electra* appeared, the Bureau of Air Commerce sent out notice to the aircraft industry that a plane was wanted that incorporated all the features of the huge airliners but which could be used outside of the large transport field. The ship was intended for small airlines and private owners. The Lockheed company then came out with the "12". This plane is the first Lockheed not to bear the name of an astronomical constellation such as the *Electra* and *Sirius*. Although smaller in size than the *Electra* it embodies almost all the basic characteristics of the bigger ship after which it was closely patterned. The "12" is an eight-place ship and carries six passengers and a crew of two.

There are four optional power plants available for the "12" but the Pratt & Whitney Wasp Jr. and the Wright E-3 engines are installed in almost all of them. When the Wasp engines are installed in the ship it is known as the "12-A" and with the Whirlwinds it is designated "12-B".

Top speed is 226 m.p.h. Cruising speed is 213 m.p.h. and it lands at 65 m.p.h. with the flaps extended.

As time goes on so must aviation. Each year brings out new types of planes that are faster, have longer endurance and are more luxurious. Lockheed has kept well up with the progress of the industry and will be far in advance of them when the new Lockheed "14" comes on the market. This new ship is at present under construction. It is known as the Lockheed "14" or *Super Electra*. Although only advance specifications and performance figures have so far been distributed, Lockheed already has received several orders for the new ships. Some are scheduled for European service while the first eight will go to Northwest Airlines.

The "14" resembles the *Electra* a great deal, but it is much larger. It can be fitted with two Cyclone G-3's or F-52's which are rated at 840 h.p. each and 760 h.p. each respectively. Two Hornets can also be used. The Hornet is rated at 750 h.p.

The span is 65 ft., 6 in. and the length is 44 ft., 3⅞ in. The height is 11 ft., 5½ in. The maximum speed the 14WG-3 (Cyclone-powered) is expected to attain is 264 m.p.h. The 14WF-52 (Cyclone-powered) is expected to hit 258 m.p.h. and the 14-H (Hornet-powered) will do approximately 250 m.p.h.

The fuselage is of the all-metal monococque construction like that in the *Electra* and the "12".

The plane is a midwing job, which is a departure from the usual Lockheed low-wing construction design. The wing is built of metal and has a single spar running through it. Covering is stressed skin. The landing gear is retractable and electrically operated. Lockheed-Fowler flaps are used. The tail group is of the twin-rudder type and is all-metal.

Thus from "just another airplane company" that got a modest start 11 years ago in a little California shack, Lockheed Aircraft Corporation today has just finished a $1,000,000 expansion program and has a backlog of unfilled orders at present that exceed $3,000,000. From a payroll of 75 men in 1934, Lockheed's payroll as of June 1 was 1,608 men.

END

NOW! A Nationwide Hook-Up with Airports Throughout America in a Gigantic Training Program!

A PRACTICAL HOME STUDY AVIATION PREP COURSE

(In 24 Lessons)

For Only $29 Pay As You Learn $1 Per Week

No matter where you live—you can equip yourself with a thorough background for ANY aviation course you may wish to pursue later on—and, finally, actually handle a plane in the air yourself—at an airport *near your home!*

This Prep Course is designed to qualify graduates to pass the written examination of the Department of Commerce for a transport pilot's license or any other pilot's license. It is complete with diagrams; your questions will be answered; your papers graded—and you will get the mental equipment necessary to take up any branch of aviation.

Arrangements are being made with airports in every State in the Union for Student's Test Flights in connection with this Prep Course.

With your 24th lesson you get a $29 Tuition Credit Coupon. A number of famous schools from coast to coast have arranged to honor these Coupons for practical flight and mechanical training.

THIS COUPON MAY START YOUR CAREER IN AVIATION MAIL IT TODAY!

Contact Publishing Corp. Dept. "PA"
Fort Lee, N. J.

Please send me by return mail full details regarding your HOME STUDY AVIATION PREP COURSE.

Name.....

Address.....

City..... State.....

Occupation..... Age.....

AVIATION APPRENTICES

If you are stumped at the high cost of training to qualify for a license and a good future in aviation—write immediately, enclosing stamp for information on opportunities now available under our

APPRENTICE PLAN

MECHANIX UNIVERSAL AVIATION SERVICE, Inc.

Strathmoor Sta., Dept. B1, Detroit, Mich.

BUFFALO PUBLIC LIBRARY
DEPARTMENT OF TECHNOLOGY

Navy Flight
(*Continued from page 20*)

miles out of the course and still being unable to get through the flight was turned back. It was estimated that at least three hours fuel would remain on arrival at Pearl Harbor.

"Reasonable doubt existed at the Fleet Air Base that we could return safely due to the fact that prevailing winds in this area are 20 knot head winds on the return course, so additional reference vessels were immediately despatched to assist. However, a decreased wind permitted the plane to arrive early with about six hours gasoline left, after a flight of 24 hours 5 minutes.

"This flight stands as an excellent example of how accurate navigation and constant attention to the automatic pilot will make an exceptionally steady course. The *Swan* was passed over without use of radio bearings both going and coming (about 1,000 miles from Honolulu).

"This flight stands out as one of the longest (3,000 statute miles) ever conducted out of Honolulu by any Navy plane. It is further characterized as an emergency expedition, totally lacking in extensive preparation made under most difficult conditions and highly successful as a flight."

END

Aero School
(*Continued from page 48*)

well be known as the "ground flying hour" for, as with all aviation enthusiasts, they persist in talking shop.

Then, a stitch of "worktime" may be drawn, for every student puts in 100 hours of worktime during his course. For example, these compulsory chores may consist of such jobs as repairing the baseball diamond, working the school tractor and disc, or similar useful jobs around the school that are both useful and effective variations on pure study. Recreation and study are not alone sufficient for health, for we must also introduce the element and attitude of work into our lives. Chores and certain exacting jobs are essential supplements to study and recreation.

For entertainment, on the "days off," the students find much to interest them in nearby St. Louis and surrounding towns. This city has all of the advantages of any large city in the way of shows and amusements while the various parks, swimming beaches and other outdoor attractions afford a grateful diversion in summer.

And then, after the recreation or work hours, come the inevitable hours of study and more study, which may extend up to but not past midnight, "and then to bed," as Mr. Pepys puts it, to freshen up the old body for another day.

END

Women
(*Continued from page 46*)

In fact, she said, the plane in which she left Washington that morning had 12 women passengers and no men. One passenger was Mrs. Franklin D. Roosevelt.

"Captain Eddie Rickenbacker, manager of our line, says that the day of glamour and entertainment in plane riding is out," she said, "Passengers want to read, to work, or to sleep—they don't want to be chatted to or have the points of interest shown them. They can pick them out themselves on the maps provided for that purpose.

"So we furnish our passengers with copies of 'Gone With the Wind,' or games, or packs of writing paper."

She said that children had been frightfully neglected on the airlines of the country, and that now the line carries toys and games just for youngsters who are passengers.

"Within a few weeks, children under 12 will be able to travel on our line at half rates just as on a railroad," she said.

She pointed out that jobs for women are becoming more and more plentiful on airlines— "But you don't have to be a porter to get a job," she added, referring again to the stewardesses. "In fact I can't imagine any mother wanting her daughter to lift heavy traps and things."

END

Designed especially for the
TAYLOR CUB

The
SWITLIK COMPAK
QUICK ATTACHABLE PARACHUTE

Be sure to request replacement buckets when ordering your "Cub" so that it will be fully equipped for use of COMPAK Chutes. Present owners may obtain these seats from factory at small cost.

The genuine Switlik Compak is now available to the owners of Taylor "Cubs" . . . decidedly one of the most popular and fastest selling small planes in America. The pack measures less than twelve inches square, yet contains the standard 24-ft. canopy and is identical in quality and performance with all of the famous Switlik Chutes. No need to carry the pack when not in use. Maintains original headroom in both forward and rear seats. No interference with rudder controls. Very moderate cost with absolute dependability. Manufactured by Switlik Parachute & Equipment Company, Trenton, New Jersey.

Sold Through The **TAYLOR AIRCRAFT CO., Lockhaven, Pa.**
ITS DISTRIBUTORS AND DEALERS
Prompt Shipment from Stock

Trans-oceanic

(*Continued from page 30*)

The service recently opened between Bermuda (British territory) and the United States also could have been in operation at least three years ago. But again Pan American was forced to wait for the government-subsidized Imperial Airways to get its Short boats. Consequently, the joint British-American service between Hamilton, Bermuda, and Port Washington, N. Y., was officially opened just last month.

The Short and Sikorsky "competitors" on the Atlantic line compare almost equally. But the American ship has the edge on the Short boat in its standard cruising range. Where the Sikorsky has a range of 1,220 miles, the Short boat has a standard range of 730 miles. However, special fuel tanks were installed in *Caledonia* for the Atlantic flights.

END

AIR-COOLED FORD A

Conversion, 180 pounds, eliminates water, radiator. Duel ignition. Low cost. No machining. Illustrations, complete instructions 50c.

ELECTRIC MANUFACTURING. ST. PAUL, Minn.

Aviation Clubs

(*Continued from page 44*)

the instructor did not think the member was capable of handling the plane very well in such weather he would refuse to let him go up and the member was allowed no complaint.

After the first few months, the records were checked and it was found that the actual expenses for gas and oil on the plane was 70 cents an hour. This left 80 cents out of each hour's flying which went to pay hangar rent, overhauls, and to set up a depreciation fund. This gave a safe margin for anything unexpected that should come up.

While making an out of town trip the member using the ship would pay 70 cents an hour instead of $1.50, but he furnished his own gas and oil. Only members with a private license were allowed to make a trip cross country unless accompanied by the instructor.

If the airplane was damaged while operating from the local airport in accordance with the club rules, the member operating the craft at the time was to be charged $25 and if the cost of repairs exceeded that amount, the excess was divided evenly among the other members. However, if the damage occurred while the member was making a cross-country flight, or while breaking any of the Department of Commerce or club rules, then the member was liable for the entire amount.

After one year of operation, a check of the records showed that the club had logged better than 300 hours; had paid for the plane in full; had soloed nine members; owed no bills and had a nice balance in the treasury. That is a record to be proud of, but the same thing can be done by any ten people who want to fly but cannot afford their own ship.

There are only a few rules to follow in putting a flying club over. First, get a group of fellows who are congenial and who are not the type to take chances with the ship. Second, select an airplane that is easy to fly and operates cheaply. Third, get a conscientious instructor who will treat your plane as though it were his own. Fourth, make your by-laws strict enough that you won't have to worry about some member cracking up the ship.

And lastly, make your meetings interesting enough to keep the members enthusiastic about flying. If you will do these things, then you too may have a successful flying club and enjoy the ownership of a modern safe airplane at ten dollars a month.

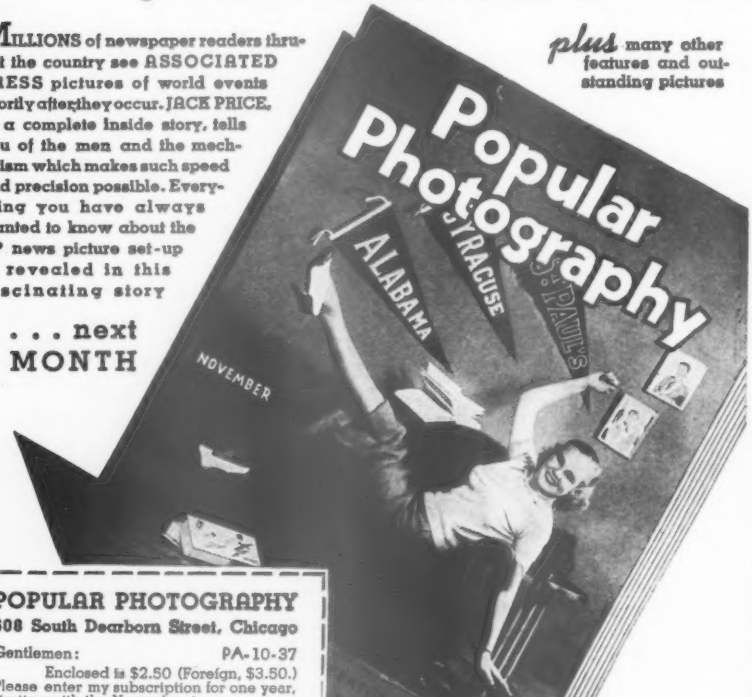
END

Flash... Another Great NEWS SCOOP will be presented in the *November Issue*

MILLIONS of newspaper readers thruout the country see ASSOCIATED PRESS pictures of world events shortly after they occur. JACK PRICE, in a complete inside story, tells you of the men and the mechanism which makes such speed and precision possible. Everything you have always wanted to know about the AP news picture set-up is revealed in this fascinating story

. . . next MONTH

plus many other features and outstanding pictures



POPULAR PHOTOGRAPHY
608 South Dearborn Street, Chicago

Gentlemen: PA-10-37

Enclosed is $2.50 (Foreign, $3.50.) Please enter my subscription for one year, starting with the November issue.

Name

Address

City State

BE SURE YOU GET YOUR NOVEMBER ISSUE

Subscribe Today!

FREE 1—Spray for Your Models. 2—1 Dz. Sheets Jap Tissue. 3—Choice of 3 20 in. plans. Curtis—Heath—Bellanca—Boeing—Driggs

Remarkable FREE OFFER one of above with purchase of $1 or more "SERVICE IS A HABIT WITH US"

18" BALSA
1/16x1/16 100, 5c
1/16x1/8 35 for 5c
1/16x3/16, 18, 5c
1/16x1/4 15 for 5c
1/16x1/2 5 for 5c
3/32x3/32 30, 5c
1/8x1/8 30 for 5c
1/8x3/16 12 for 5c
1/8x1/4 10 for 5c
3/16x3/16 8, 5c
1/4x1/4 6 for 5c
1/4x1/2 3 for 5c
1/2x1/2 2 for 5c

18" Balsa Sheets
1/32x2...5 for 5c
1/16x2...5 for 5c
3/32x2...4 for 5c
1/8x2...4 for 5c
1/16x2...2 for 5c
1/4x2...2 for 5c
1/2x2...1 for 5c
3" sheets or 36" lengths, double above prices; add 10c packing charge for 36" lengths.

NOSE BLOCKS
1x2x1 .....1c
2x2x1 .....5c
2x2½x1 .....5c
3x3x1 .....5c
3x3x2 .....8c
3x3x3 .....10c

Alum. Tubing
1/16", 3/16" .....1c ft.

Rubber Motors
1/16 sq. 20 ft. 5c
⅛ flat 20 ft. 5c

Sheet Aluminum
.003 ..sq. ft. 10c

TISSUE, AA
All col., doz. 19c
Silver .....ea. 5c
Superfine, wh. 5c

WHEELS per pr.

Brch	Bisa	Celu
½	.01	.03
¾	.02	.04 .05
1	.03	.05 .07
1⅜	.04	.08 .10
1⅞	.07	.10 .16
3		.15 .30

18" Balsa Planks
1x1" ...1 for 4c
1x2 ...1 for 9c
2x2 ...1 for 15c
2x3 ...1 for 23c
2x6 ...1 for 35c

PROPELLER BLOCKS
½x ⅝x 6 6—5c
¼x ⅜x 6 6—5c
⅜x1 x 8 3—5c
⅜x1¼x10 2—5c
¾x1¼x12 3c ea.
1 x1½x12 6c ea.
1 x1½x15 7c ea.

DOPE Clear
1 oz. 5c ½ pt. 25c
2 oz. 10c

Colored
1 oz. 5c ½ pt. 30c
2 oz. 10c

BAMBOO 11 in.
1/16x¼..6 for 5c
Shredded 40—5c

ALUM. LEAF
2 Sheets 1c

WIRE
6 ft. 3c

THINNER
Best, 1 oz.....5c

REED
1/32, 1/16"
3 ft. 1c
½ in. ...3 ft. 2c

PROP. SHAFTS
2 .....for 1c

PAUL-O-WINA
10c. Add 5c per in. up to 10 in.

MACHINE PROPS.
5 in. 4c
Add 1c per in. up to 16 in.

THRUST BEARINGS 1c
BUSHINGS
Doz. 3c

ALUMINUM WHEELS
1" pr.....6c
1⅜" pr.....11c
1¾" pr.....14c

NOSE PLUGS
large ...10c doz.
small ...5c doz.

CEMENT
1 oz. 5c
½ pt. 25c

Model Pins
pkg. 5c
Brushes No. 6 5c

INSIGNIAS—
French, American, English, German
1¼" ....4 for 3c
2" 1c
1 sheet of 24, 5c

Dummy Radial Engines
1½" Diam. ..14c
2" Diam. ..18c
3" Diam. ..23c

Sheet Celluloid
2x6 .....2c
6x8 .....4c
12x16 .....15c

Wood Veneer
20x30" ..1 for 9c
2 for 17c

ORDERS 75c or under 15c postage. Postage prepaid on orders over 75c. W. of Mississippi add 10c extra. Canada: add 15c extra on orders under $1.00. On orders over $1.00 add 15%. CASH or M.O.—NO STAMPS—NO C.O.D.'S

SKYWAY MODEL AIRCRAFT SUPPLY CO.
383 Seventh Ave., Dept. P, Brooklyn, N. Y.

BUFFALO PUBLIC LIBRARY
DEPARTMENT OF TECHNOLOGY

An Airy Chat with the Editor

(Continued from page 14)

the effect that a gas propelled model airplane comes under the regulations in force for full size planes. In short, you cannot fly a gas model in the State of Massachusetts unless you are a licensed pilot! The fact that you are on the ground while your model is flying and that it is impossible for the model to carry a passenger, makes no difference at all to this public official.

We wonder how soon it will be before they compel little Bobby to license his toy automobile or make the proud father of little Bobby take out a truck driver's license for wheeling Bobby in his baby carriage. The State of Massachusetts always did take its state aviation laws very seriously and now they are reaping the ultimate reward.

* * *

TO ALLOW this action to pass without protest is dangerous to the future of aviation. Every gas model club in the United States should send in their denunciation of the ruling as soon as possible so that a little liberty will be granted to the boys in Massachusetts who wish to participate in that greatest of outdoor sports—gas model flying.

* * *

OUT in the State of Oregon we have the reverse condition, a state and state officials warmly supporting amateur aviation and aviation in general. It was only a short time ago when the amateurs of Oregon gave a wonderful demonstration at Eugene, Oregon, during a fete week, marking the importance and esteem in which Oregon holds its amateur pilots.

* * *

WELL, finally the weatherman and Max Karant came to an agreement, the wind subsided and the rain went away so that Max was able to make his maiden parachute jump and thus become the member of the Rip Cord Club of the World. And I'll say that it was a swell jump, with Maxie landing on his feet and remaining on his feet until the rescue car arrived.

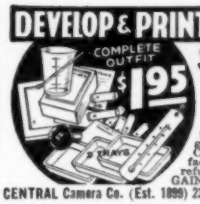
You'll find the story of this jump in this issue together with the sensations experienced on the way down. This story is well worth while and was written almost immediately after the jump so that all of the heart throbs and thrills were still in mind.

We had a lot of fun up here in the office, doping out suitable headlines for the story among which were: "On My Way Down," "Out of the Little Side Door," "My Longest Step" and "I Fool Old Man Gravity." All in all, Max provided us with a great diversion that gave us as much of a thrill as it did him.

* * *

I'll be seeing you.—J. B. R.

DEVELOP & PRINT YOUR OWN SNAPSHOTS



Save One Half!

• Save money developing and printing your own pictures! . . . No experience needed . . . Send only $1.96 for COMPLETE professional outfit, including electric ruby lamp, developing and fixing trays, chemical, photographic paper, directions — or sent C.O.D. $1.98 plus postage. Satisfaction GUARANTEED or money refunded. Write for FREE BARGAIN BOOK of cameras and supplies.

CENTRAL Camera Co. (Est. 1899) 230 S. Wabash, Dept. PA-10, Chicago

MODEL BUILDERS' HOME CRAFTSMEN!

big 64-page catalog & LARGE SUPPLEMENT!

Saves Money, Time in Buying!

Model Airplane, R.R., Ship, Gas and Steam Engine, Racing Car, Kits, Supplies, Accessories, Hard-to-get parts, sheet metals, rods, wires, bolts, screws, etc., etc., (all very fine sizes). Thousands of tiny items. Send 15c (coin) today for both copies (none free). Supply limited. Act quick. Dealers: Write!

CLEVELAND MODEL & SUPPLY CO., Inc.

4508-APA16 Lorain Ave. : : Cleveland, Ohio, U.S.A.

AUTOMOBILE RACING BOOK

(Fourth Edition)

Nine Chapters, 66 illustrations of dirt, midget and championship cars and drivers. How to build cars and bodies; 14 plates working drawings. Converting stock cars to 135 m.p.h. racers. Book answers all questions in speeding up cars, balance, speed revs., rules, specifications, track records, etc. Postpaid $1.00 C.O.D. $1.12. Order NOW.

RAY F. KUNS, Dept. E-10, Madisonville, Cincinnati, Ohio.

FLY IT'S EASY

Condensed instruction book, illustrated, with Control and Flight Charts; endorsed by America's Million Dollar Flying School; invaluable whether you intend to fly now or later. Postpaid. $1

H. O. CLAYWELL

Licensed Pilot International

3730 Holmes Dallas, Texas

AIR INDUSTRIES, INC.

DETROIT CITY AIRPORT

INVITES INSPECTION OF

THE NEW STINSON RELIANT

THE NEW RYAN S-T

High Performance, Low-Wing Metal Monoplane

AND THE SENSATIONAL NEW

WELCH "RABBIT" PRICED AT $1080

—— FLIGHT INSTRUCTION ——

AIR INDUSTRIES, INC.

DETROIT CITY AIRPORT **PINGREE 9760**

National Air Board

(Continued from page 34)

the homing pigeon in similar fashion? A whole field of speculation is opened by this curious phenomenon, to the electrical expert, the medical expert, the ornithologist and the physicist.

A Really Good Argument for the Airship

In a recent hearing before the House Committee on Naval Affairs, Admiral W. D. Leahy, Chief of Naval Operations, reported that the Navy had found the airship "wanting". Admiral A. B. Cook, Chief of the Bureau of Aeronautics, came back with the following rejoinder:

". . . when the Akron and Macon were built they were intended for scout duty, but, with the development of big seaplanes within the next five years, I expect that the heavier-than-air scout would replace the airship and exceed in its efficiency.

"We have plans now on the drawing boards of an airship of about 10,000,000 cubic feet capacity, which would carry nine bombing planes weighing, with load, about 10,000 pounds each.

"That airship would be classed as an aircraft carrier. It would cruise at between 60 and 70 m.p.h. and have the range of the surface carrier—about 15,000 miles—but more than twice its speed.

"Seven such ships, carrying the same number of planes as the modern surface aircraft carrier, would cost about the same amount of money as the surface vessel," Admiral Cook added. Its advantages, he said, would be many.

It would, he said, be able to launch its planes at altitude and thus save valuable time in an emergency and its planes would have greater range and higher speed than similar bombers launched from a flying deck, because they could do without landing gear and, being launched from the air, could be more heavily loaded than planes taking off from a deck.

The airship, Admiral Cook admitted, was a vulnerable target, but he held that the surface carrier was also vulnerable.

James B. Taylor, Jr., thought that this was by far the best argument in favor of building naval airships that had been advanced of late. Certainly the airship even of 10,000,000 cubic feet would be far less expensive than the surface carrier. Moreover, said Mr. Taylor, while the surface carrier could not be destroyed as readily as the airship, its landing deck could certainly be put out of commission with a single bomb, so that from the point of view of military vulnerability there was nothing to choose between the two types. In a very large airship there would be found room to house at least nine or ten 10,000 pound seaplanes or bombers, and the potentialities of the long range airship coupled with the long range of its airplanes would be very high.

The Board agreed that Admiral Cook had put the whole question of naval airships in a new and highly favorable light.

What an Airship Might Have Done in the Earhart Search

As another illustration of the service which an airship can render on occasion, Mr. Taylor cited the search for Amelia Earhart. While the naval aircraft carrier was steaming to the scene of the disaster and while its planes were waiting for favorable flying weather, the airship would have already been on the job for a couple of days!

What Oxygen Does to Teeth Fillings

The Board learned with some amusement from Mr. Taylor that long exposure to oxygen frequently causes teeth fillings to fall out. These round table discussions often lead to the exploration of curious topics.

American Progress in Glider Construction

Earl Southee gave a first-hand account of the latest Elmira meet. According to Mr. Southee, the most striking feature of the meet was the extraordinary progress made by American constructors. In aerodynamics, in performance, in structure and finish, the American-built gliders are now definitely superior to the German gliders which have been in the lead for so long. Mr. Southee particularly cited the remarkable work of the Schweizer Brothers, two young men of Peekskill who, working in a simple garage, have produced a remarkable all metal glider, with extruded shapes of aluminum alloy, flush rivets and other refinements of metal construction, which one would hardly credit to be possible in the glider.

END

AERONAUTICAL UNIVERSITY

(Founded by Curtiss-Wright)

Government Approved — State Accredited

Graduates are with all leading aircraft companies and air lines.

Courses in

AERONAUTICAL ENGINEERING (B.S. DEGREE)
Mathematics, Drafting, Airplane Design, Stress Analysis, Wind Tunnel, etc.; thirty subjects.

LICENSED MECHANICS
Prepares for Government licenses: Airplane, Engines and Radio. Includes Sheet Metal, Welding, Drafting, Aircraft Construction, Engines, Inspection and Maintenance.

ADMINISTRATION
Transport, Traffic, Sales, Aviation-Advertising, Aerial Photography, Airport Accounting, Navigation, Meteorology, Airplanes, Engines, Radio for U. S. Government License.

AERONAUTICAL ENGINEERING, DISPATCHING AND DRAFTING COURSES
Outstanding faculty. Up-to-date equipment. Reasonable tuition. Easy terms. Day and Evening Sessions. Enroll now.

Write for Free Illustrated Bulletin and "Aero News"

Address

AU ACCREDITED

AERONAUTICAL UNIVERSITY
CURTISS-WRIGHT BLDG.
Dept. P. A.
1338 S. Michigan Blvd.
Chicago, Illinois

THE NEW MOULDED **SELLEY-TEX**

PATENTED

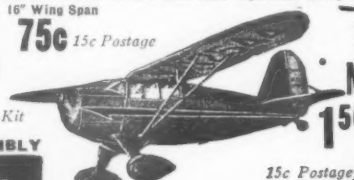
THE NEW METHOD OF MODEL BUILDING

CONSTRUCTION KITS THE MOST TALKED OF KITS IN THE COUNTRY!

These new sensational moulded SELLEY-TEX Construction Kits build the finest and the most fully detailed authentic flying scale models ever produced. They stand alone—are actually years ahead of all model competition. SELLEY-TEX Kits are the only kits that you can buy that does not require an expert to assemble and even novices with little experience easily and successfully build and fly SELLEY-TEX models.

SELLEY-TEX AERONCA
A Guaranteed Kit
16" Wing Span
50c
10c Postage

SELLEY-TEX REARWIN SPORTSTER
A Guaranteed Kit
16" Wing Span
75c *15c Postage*

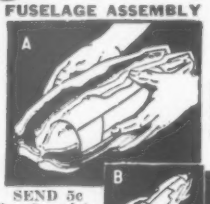


SELLEY-TEX MOTH
1.50
15c Postage

ALL FINISHED MOULDED ASSEMBLY KIT

22" Wing Span

FUSELAGE ASSEMBLY



Wingspan		
Bellanca Swoop	20"	$1.00
Monocoupe	20"	1.25
Lockheed Orion	20"	1.25
Vought Corsair	18"	1.25
Curt. Osprey	18½"	1.25

Add 15c packing

SEND 5c for Complete Catalog of Ship Model and Airplane Supplies

GUARANTEED TO FLY 200 FEET

EVERY SELLEY-TEX KIT CONTAINS:

The necessary moulded fuselage sides, cowl, pants, bombs, motor, etc., sawcut propeller, scale propeller parts, formed wire hooks, scaled wheels, brass bushings, ribs printed out on balsa, turned wood parts, tail wheel fork fittings, wire, para rubber motor, colored paper, authentic markings, colored insignia, cement, colored dopes and easy to understand plans, all are packed in a beautiful, sturdy box.

THE LEADING STORES CARRY SELLEY-TEX "There's a reason."

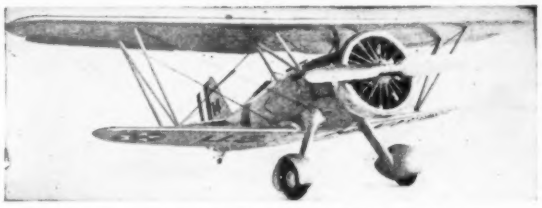
BOYS! All FIRST CLASS DEPARTMENT STORES, RETAILERS, carry SELLEY-TEX Kits. If their supply is exhausted order direct. REFUSE STICK MODEL SUBSTITUTES. DEMAND THE SELLEY-TEX GUARANTEED KIT, the standby of Craftsmen.

ONE HOUR BUILDING TIME TO ASSEMBLE THIS SNAPPY FLYER

HERE AT LAST IS A SUPER QUALITY model that is scientifically designed that will give amazingly long flights, either from the hand or off the ground. All parts of the Moth are beautifully moulded in the form of light, hollow shells, perfectly shaped and fully detailed. The fuselage shells are firmly fused together, forming a perfect crash-proof fuselage. All wing surfaces are moulded to the correct wing curves and are completely finished. Ask your dealer—if he can't supply you, send direct $1.50, plus 15c postage.

SELLEY MFG CO. INC. DEPT 410 1373 GATES AVENUE, BROOKLYN, N. Y.

NEW CURTISS F11C4 NAVY PURSUIT



28" Span. Length 20½". Weight 4 oz. 1" Scale

THE MOST EXCLUSIVE AND FINEST EQUIPPED MODEL IN THE WORLD
A special De Luxe model, one of the most beautiful and finely detailed ever made, with its special exact scale 3¾" celluloid, 1000 H.P. type, Wright Cyclone motor, having aluminum push rods, cylinder fins, etc., like real motor. Also in set are 4" aluminum cowl ring, 9" carved sprucee semi-scale flying propeller, colored star and rudder insignia, 2" celluloid balloon wheels, silver dope, paint, black, red striping, Navy lettering, wire parts formed, axles, rubber motor, windshield, instrument board, flying wires, 4 aluminum wing plates, aluminum wing walks, ready cut wheel pants, etc. All other parts printed on balsa. Detail scale drawing.
Construction Set complete, postpaid..... $4.50

41" LOCKHEED ARMY SPEED VEGA

41" Span. Length 28". Weight 8 oz. 1" Scale

This new model, built very strong yet light in weight, is practically crashproof and will out-perform any large scale model built. Rises from ground in 10 feet and flies over 650 feet. Set contains all parts printed on balsa, ready cut pant cores, 4¼" turned motor front, 11" steel type carved paulownia wood propeller, 2½" balsa wheels, tail wheel, formed wire parts, 26' rubber, 3 oz. yellow dope, 2 oz. blue, ¼ oz. black, 2 oz. glue, cement covering, full size scale drawing, and all parts.
Construction Set complete, postpaid..... $4.95
ELF 1/10 H.P. Gas Motor may be used on this Vega model.

NEW NORTHROP A-17 ARMY ATTACK

24" Span. Length 17". Weight 2¼ oz. ½" Scale
Color yellow and blue

A new scale model of one of the 125 Northrops ordered for the U. S. Army. Set contains all parts printed on balsa, turned motor front, 7" carved propeller, insignia, wheels, set of colored dope, glue, and all parts.
Const. set in labeled box, postpaid..... $2.50

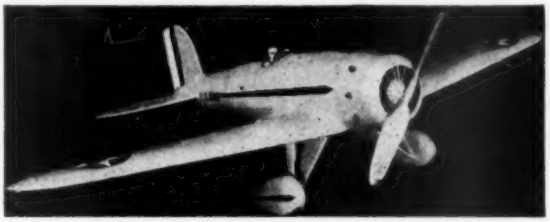
NEW LOCKHEED ELECTRA R-20-1

27½" Span. Length 19". ½" Scale. Color silver and red. This is an exact scale model of plane used by Amelia Earhart and transport lines.

Set has all parts printed on balsa, turned motor fronts, carved steel type props, set of 3 colored paints, glue, etc., balsa wheels, concealed motor unit through fuselage. Scale drawing.
Construction Set complete, postpaid..... $2.95

Note: In issuing money orders, use St. George, N. Y., postoffice

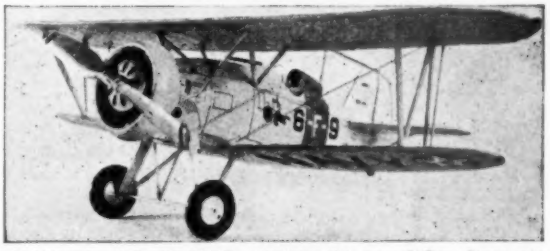
NEW LOCKHEED P23A NAVY FIGHTER



COMBINATION LAND AND SEA PLANE SET
32" Span. Length 20⅛". Weight 3½ oz. ¾" Scale

New 4-gun Navy fighter. Model will rise from land or water in few feet. Construction set contains fuselage and pontoon formers, wing ribs, tips, etc., printed on balsa, a 3⅜" turned cowl front, 2 instrument boards, colored insignia, lettering, windshields, 9" carved scale flying prop shown, 3 oz. silver paint, 1 oz. cement, ¼ oz. black, 2 oz. glue, ready cut wheel pants, strong 2" aluminum wheels, 12 feet of rubber, and large 33"x44" drawing of land and sea plane. This is a sensational model and only one of its type in the world.
Construction Set in labeled gift box, postpaid..... $2.95
Above model is latest improved type, just out.

NEW BOEING F4B4 NAVY FIGHTER



22½" Span. Length 14½". Weight 2½ oz. Color, Grey, etc.

This is the finest equipped Boeing, F4B4 model in the world. New improved model exclusively equipped with new 3¼" special aluminum streamline tapered cowl ring, 9 cylinder celluloid motor with aluminum ventilator front, 8" carved varnished steel type propeller, printed out balsa wood parts, 2 oz. grey dope, ⅛ oz. yellow, ⅛ oz. red, paper cement, glue, formed wire parts, celluloid wheels, tail wheel, U. S. Navy lettering, colored insignia, and ¾" scale drawing. **Construction Set complete, postpaid..... $2.95**

NEW CURTISS Y1A-18 ARMY ATTACK

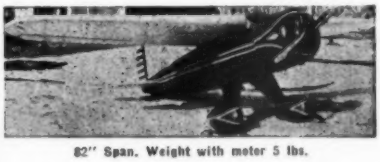
38" Span. Length 26". Color yellow and blue

This new twin motor model has lots of reserve power on its two 8" props and flies very well. Set as all parts printed on balsa, colored paints, glue, etc., full size scale drawing, two 3" turned balsa motor fronts, wheels, two 8" steel type carved props, etc. **Const. set, postpaid..... $4.50**

Brown Jr. 1/5 H.P.

Long life motor with steel cylinder and piston for models of 5 to 8-foot span. ⅜" bore, 1" stroke. Complete as shown in illustration, ready to run.
Price..... $21.50

LOCKHEED VEGA GAS MODEL



82" Span. Weight with motor 5 lbs.

Set contains formers, ribs, tips, pants, etc., all ready cut to shape, 8¾" turned motor front, 4½" rubber tired air wheels, silk covering, glue, and full sized drawing. This is a dry set without liquids.
Price set, f.o.b. N.Y..... $17.50

PRICES ON ALL OUR MODELS READY TO FLY SHOWN IN CATALOG.

NEW 1938 CATALOG No. 4—16 PAGES 7½" x 9½".

Catalog contains 6" photos of the finest models you have ever seen. Two cover etchings suitable for framing.

SEND 10c COIN

Note: Orders sent West of Miss. or Foreign, add 20c postage

California Dealer: JAYS MODEL AIRCRAFT, 7763 Melrose Ave., Hollywood, California

MINIATURE AIRCRAFT CORP., 83 Low Terrace, New Brighton, New York

A NEW OLYMPIC
CANDID CAMERA
INTRODUCED AT $4.95

Made to sell at a higher price, it is ideal for Fast Action Pictures. Fast fully corrected Achromatic Lens that is adjustable to F.8, F.11, F.16 and F.24. Speed Shutter and Critical Focusing adjustment with Telescopic View Finder. Built-in Tripod Socket and furnished with Cable Release for Shutter. Precision built and Beautifully Finished with all Metal Lens Adjustments. Uses the economical 127 V.P. film and takes 16 Clear Sharp Pictures in Natural Color as well as Black and White which are excellent for enlarging up to 8" by 10". ORDER NOW for Special Introductory Price of only $4.95 Postpaid. C.O.D. if preferred plus postage.

Special Military Waterproof Leather Case with shoulder strap that is most practical and lends smartness is $1.50.

CANDID CAMERA SUPPLY CO.
303 West 42 Street Dept. J-3 New York, N. Y.

???????????????
Did You Ever See a
BOEING BUILT
GA-2

—a JL-12? or an A-3?—chances are you haven't.

These were some of the first of America's attack planes . . . For the thrilling story of the birth and growth of Uncle Sam's attack aviation read . . .

Butcher-Birds of the Air Corps
IN THE NOVEMBER ISSUE
POPULAR
★★★ AVIATION ★★★

POPULAR AVIATION, PA-10
608 S. Dearborn Street,
Chicago, Illinois.
Gentlemen:
I want your special offer of five issues of P. A. for one dollar. Start my subscription with the October issue and send me the bill.
Name .....
Address .....
City ..... State .....

Rocket Developments

(*Continued from page 49*)

Hence, it follows, that the majority of the rocket demonstrations of the past few years have been made by those anxious to demonstrate how mail might be carried. As such they have been largely for the benefit of philatelists. Others too have been staged, more often than not, by mere publicity seekers.

As a consequence, far greater progress has actually been made in rocketry than the public demonstrations would indicate, and the general public of today has little idea of the vast amount of competent scientific research which has already been accomplished.

Consider, for example, the record of the German Rocket Society before it was dissolved in 1933 as a result of the Hitler regime. During the period August, 1929 to June, 1933, this Society made over 500 ground tests—that is mainly at the "proving stand"—and, at one time, the number of engineers engaged on this practical experimental work amounted to 16.

Instead of spectacular rocket shots, they concentrated their energies on experiments dealing with the combustion of petroleum with liquid oxygen, the stabilizing of the rocket in flight, the arrangement of the fuel chambers, and the provision of parachutes for bringing the burnt-out rockets back safely to earth.

Similarly, the American Rocket Society has never aimed for immediate sensational results. Profiting largely from the work of its German companion, it has sought to build up a technique of rocketry on a solid basis which will make its future secure. Its work has been mainly directed to the provision of fuel feeding systems which do not require pumps, to dependable landing gear, and to the development of proper steering apparatus.

No more interesting example of the intensive and specialized treatment of the problem of rocket flight could be given than that of the work of its pioneer worker—Professor Goddard.

Professor Goddard started experimental work with rockets over 20 years ago, and in 1919, as all the world knows, published the results of his experiments under the title "A Method of Reaching Extreme Altitudes," by which he verified his previous belief that the rocket would function as effectively, or more so, in a vacuum. This publication constitutes volume 71, No. 2 of the Smithsonian Miscellaneous Collections, and can be obtained from the Smithsonian Institute, Washington, D. C.

He continued his experimental work for 17 years before he published a further report. This was published as recently as March, 1936, under the title "Liquid-Propellant Rocket Development," and constitutes volume 95, No. 3. (Publication 3381) of the series above referred to. It is obtainable from the same source at the same price as his previous report.

The following is a brief resume of the manner in which Professor Goddard attacked the problem of rocket flight. It is an amazing example of tenacity of purpose, and is conclusive proof of the meticulous and exhaustive manner in which rocket experimentation of today is being carried out.

For several years following his epoch making publication Professor Goddard, aided by a meagre grant from the Smithsonian Society, quietly went on with his experimental rocketry. Satisfied at last that liquid fuel was to be preferred to powder fuels, his first task lay in deciding on the best combinations. After 3 years' work he decided, in 1922, that the most practical combination was one of liquid oxygen and gasoline.

He then decided the most important factor in the development of rocketry was adequate control—a not surprising decision seeing how erratic in their behavior rockets had proved in the past. *For 14 years he labored at this problem before he achieved success!*

In the first instance he directed his attention to the so-called "nose-drive" construction, only to discard it in favor of a pendulum device. This, in turn, gave place to a system of small gyroscopes which actuated vanes in the exhaust jet of the rocket motor when the axes deviated more than 10 degrees from the vertical.

It was not until March, 1936, that Professor Goddard was able to announce to the world that he had at last successfully achieved stabilization of the rocket by this means.

(*Concluded on page 72*)

AERONAUTICAL ENGINEERING
DEGREE IN 2 YEARS

Become an Aeronautical Engineer. Tri-State College course given in 108 Weeks. Bachelor of Science degree. Graduates in Mechanical Engineering can complete aeronautical course in 2 terms (24 weeks). Thorough training in all fundamental engineering subjects. Equipped with wind-tunnel (see illustration). Non-essentials eliminated. Courses designed to save student time and money. Flying school facilities available at nearby airports. Properly trained engineers in design, research, manufacture and sales work are in demand. Enter September, January, March, June. Courses are offered also in Civil, Electrical, Mechanical, Chemical, Radio Engineering; Business Administration and Accounting. Living costs and tuition low. Those who lack high school may make up work. World famous for technical 2-year courses. Graduates successful. Write for catalog.

7107 COLLEGE AVE., ANGOLA, IND.
TRI-STATE COLLEGE

BOSTON PUBLIC LIBRARY
DEPARTMENT OF TECHNOLOGY

BUYERS' DIRECTORY

RATES: $7.00 per inch

AIRPLANE ENGINES

FLEA SHIP FREE!

An American Flea Ship absolutely free with purchase of a Universal 40 h.p. four-in-line Air-Cooled Motor at $134.95—a $250.00 value. $12.50 down, easy payments. A real airplane—200 lb. useful load, equipped with standard controls and oversize tires. Propellers, $2.98 up. Air-Wheels and Aircraft Supplies. Send 25c for illustrated information.

UNIVERSAL AIRCRAFT, FORT WORTH, TEXAS

PROPELLERS

UNIVERSAL PROPELLERS

at reduced prices. Laminated, accurately balanced, highly efficient. Order from this ad. Price-list upon request.

4' for Harley and Indian Motors.....$ 3.50
4' 6" Heath-Henderson, metal tipped..... 7.65
6' Fords, Lawrence, Anzani, metal tipped..... 9.98
7' Velie, LeBlond, hardwood, copper tipped..... 15.75
8' OX-5, hardwood, copper tipped..... 16.98
MOTORS: 40 h.p., rebuilt like new..... 49.98
SHIPS: Famous 98 Trainer, Single Place..... 98.00
TIRES: 7.00-4 Air-Wheels, including hubs..... 16.00

UNIVERSAL AIRCRAFT CO., Dept. I, Ft. Worth, Tex.

BOOKS

AERO BLUE BOOK

Gives specification of over 400 airplanes and nearly 150 aero engines; appraised value of many second hand planes; valuable points on buying used planes; data on choosing a flying school. Only information of its kind ever compiled. Priceless to students, engineers, dealers and flyers. Send $1 (money order or currency.)

AIRCRAFT DISTRIBUTING CO. Section 10-PA
1480 Arcade Bldg., St. Louis, Mo.

$1.00 Prepaid

Aviation Books

Complete Stock of Books on All Aviation Subjects.

Send for Catalog.

GOODHEART-WILLCOX

2009 So. Michigan Ave., P.A. 10, Chicago, Ill.

LIGHTPLANE DESIGN

The Fact-Book for the Home-Builder
APPROVED BY EXPERTS
Sold With a Money-Back Guarantee
WRITE FOR FREE LITERATURE
WALTER H. KORFF, Aeronautical Engineer
P.O. Box 5304—42nd St. Station INDIANAPOLIS, INDIANA

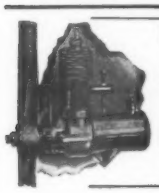
MODEL AIRPLANES (Ready Built)

Actual "Goshawk" Model

FINISHED MODELS
Modern and wartime airplane models built to order. Pine construction; lacquered and rigged properly. Wing-spans 3 inches to 7 inches. Smooth and glossy finish guaranteed. Name your model. Price .....$1.50 each
Seaplanes, amphibians, and autogiros.....$1.75 each
No C.O.D. orders. Canadian and Foreign duty C.O.D. Satisfaction guaranteed. Please print your name and address.

MUELLER BROS. 28 Peach Street Buffalo, N. Y.

MODEL AIRPLANE SUPPLIES



HURLEMAN
ARISTOCRAT
MODEL AIRPLANE MOTOR
⅞" Bore, 1" Stroke. 4500 r.p.m.
PRICE $17.50
Light weight Coils—Plugs
Send 3c Stamp for Folder
Mfg. Solely by and Obtainable Only From
WALTER HURLEMAN, INC.
1428 W. Bristol St., Phila., Pa.

MISCELLANEOUS

ALUMINUM ALLOY PISTONS

For all makes and models of MODEL, AVIATION, MIDGET, outboard, marine, automotive, motorcycle, diesel and industrial motors. Finished and semi-finished . . . any oversize. Wrist pins.

Catalog on request.

JUDSON MFG. CO.
Hedge & Gillingham Sts.
Philadelphia, Pa.

SAFETY

Newest airline to use Pyroil is United Air Transport, Ltd., Edmonton, Alberta, to the Yukon. Aviation Pyroil assures maximum safety. Prevents corrosive attack. Reduces friction, wear. Pyroil Company, 452 La Follette Avenue, La Crosse, Wisconsin, U.S.A.

CLASSIFIED

Rate: 15 cents per word.
Minimum: 10 words.

AIRPLANES FOR SALE

NEW TWO-PLACE Buhl Pup Type, uncovered, worth $400.00, only $95.00, crated. Standard Propellers, Fort Worth, Tex.

WACO 10—OX5, good flying condition, air wheels, $400.00. Chas. Zeman, Silvis, Ill.

WELCH, TWO-PLACE, Cabin, Szekely "45", identified—$325.00. Carl Conkle, R.R. 1, Gaston, Ind.

ENGINES

FOR SALE—Used Szekely SR30 with carburetor and magnetos, $95.00 "as is". Overhauled 3 cyl. Anzani $148.50. Karl Ort, York, Pa.

FOR SALE OR TRADE

WANTED FOR CASH—Good used bank and pitch indicator, or either single unit. List any other used instruments and price. Have copy of Engineering Aerodynamics by Diehl, good condition; make offer. H. E. Brennert, 398 Lincoln Ave., Grantwood, N. J.

CURTIS JUNIOR to trade on car or another light ship. L. F. Clemenson, 480 Edith Ave., Johnstown, Pa.

INSTRUCTION

WILL YOUR LIGHTPLANE FLY? Complete, accurate performance estimates, only $3.00. Other design services. Your problems solved. Autry Aero Design, Boonville, Indiana.

RADIO ENGINEERING, broadcasting, aviation and police radio. Servicing, Marine and Morse Telegraphy taught thoroughly. All expenses low. Catalog free. Dodge's Institute, Davis St., Valparaiso, Ind.

YOU CAN BECOME a graduate airplane mechanic in ten weeks at $1.00 per week! Free catalog. Home Training. United Air School, Box 528, Elgin, Ill.

PHOTOS

KNOW aircraft. Every type. Names, dates, records. 92 pictures, $1.00. Blondin Chart Co., Box 34, Los Angeles, California.

ROLLS Developed—Two Beautiful Double Weight Professional Enlargements, 8 Never Fade Prints, 25c. Century Photo Service, La Crosse, Wis.

MISCELLANEOUS

NEW AIRPLANE, Transport Course, etc., combination offer. All for $1688. 1/3 down. Write for details. Bennett Air Service, Central Jersey Airport, Hightstown, New Jersey.

COMPLETE drawings, plans for building man carrying glider, 25c. Airplanes, How To Fly Them, 62 page booklet, illustrated, 20c. Federal, Box 344, Dept. 11, Indianapolis, Ind.

WANTED—Responsible party wishes financial assistance through Transport pilot's course. Details. Paul Lovas, 24 Westchester Avenue, White Plains, New York.

GLIDERS—PRIMARY TRAINING. Knocked-down Construction Kits. 10c coin for full particulars. Money refunded first order. McFarland Aircraft Corporation, Greenville, Ohio, U. S. A.

MOTORS WANTED! Motorcycle, motor-wheel, outboard, wash-machine, others. Shipps, Box 543, Zanesville, Ohio.

↑ Goes She Up ↑

or does it?

Flying—what there was of it four centuries ago—was the sheerest guesswork. Whether De Rozier's hot air balloon (above) would ever get off the ground was as much a source of amazement to that hardy aeronautical pioneer as it was to the curious people who looked upon him as a lunatic.

But that was four centuries ago. This is 1937. A new year is not far off. For the past ten years POPULAR AVIATION has chronicled the new and the unusual in aviation; the novel and the commonplace. During 1937 many aeronautical advancements were discussed in this magazine by able writers. Next year will see even greater things. Like, for instance, trans-Polar airlines. We are so convinced of the practicability of such an airline that the next issue of POPULAR AVIATION will contain an authoritative article on the subject by Prof. William H. Hobbs, famed authority on the Arctic, of the geology department of the University of Michigan.

Read. . .

Are Trans-Arctic Airlines Next?

by William H. Hobbs

Author of "Peary".

SPECIAL FEATURE IN THE NOVEMBER ISSUE of **POPULAR AVIATION**